1272184

EMSL ANALYTICAL, INC.

200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (845) 469-8671
FAX: (845) 231-6017

29 October 2013

Douglas Kent
TechLaw, Inc.
ESAT Region 8
16194 W. 45th Drive
Golden, CO 80403

Mr. Kent,

Thank you for your visit to our Libby laboratory on September 25th and 26th. Please find enclosed documentation of the corrective actions we discussed. These corrective actions include:

1) All EMSL/Libby analysts assign NaK codes to the 40 spectra of LA from the mine. Results for both before and after training are provided in a tabular format.
2) Index 3 diffraction patterns of NIST SRM 1867 actinolite. Include print-outs of EDS spectra for the 3 structures that had their diffraction patterns indexed.
3) Index 3 diffraction patterns of diopside from the bulk sample provided by ESAT. Include print-outs of EDS spectra for the 3 structures that had their diffraction patterns indexed.
4) The results of the intra-EMSL inter-lab study, which will include evaluation of NaK concordance.

Libby Amphibole EDXA interpretation

As you are aware LA particles are characterized by the presence of sodium, magnesium, potassium, calcium and iron. Aluminum is usually absent, but may occur at low levels in some structures. The use of EDS to classify an amphibole particle as LA is complicated by a number of factors, including a) inherent variability in chemical composition of different LA particles, b) dependence of the spectrum on random variables such as particle thickness, orientation, and proximity to other particles , c) variation between instruments in sensitivity to different elemental constituents, d) the presences of pyroxenes in the Rainey Creek Geologic Complex and e) subjective nature of spectra interpretation. For these reasons, it is not possible to define a single unique EDS spectrum for LA particles and an extensive library of references is needed to confirm a structure's identity. As such, the lab ran 40 spectra from the Libby Amphibole standards. These standards were used for the Libby Amphibole Spectra study in 2002. According to the SRC (Syracuse Research Center) these standards are from the following locations and contain the following minerals.

Sample Number	Source	Primary Amphibole Components
SW01201	Libby mine (site 20)	Tremolite, Actinolite
SW01281	Libby mine (site 28)	Richterite, Winchite
SW01231	Libby mine (site 23)	Tremolite, Actinolite, Richterite, Winchite
SW01TR1	NIST	Tremolite

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Each analyst was instructed to independently assign mineral classification and NaK content for each spectra. I then personally reviewed with each individual analyst their data and spectra interpretations. It was
apparent from these discussions that the Libby staff had been trained to interpret that any energy channel above background should be considered clearly present. Due to the background and noise that are inherent to all EDXA systems this resulted in the majority of their spectra being classified as NaK. Additional training on EDXA theory and the production of statistically significant peaks was performed. After our discussion and the discussion with Doug Kent and Nathan DelHirro the exercise was run again. The results of these exercises are attached as well as the training record that was provided to each TEM analyst at Libby. **Please see attachments EMSL1.**

SAED/EDXA study of NIST 1867 Actinolite

The lab prepared a TEM drop mount of the NIST 1867 Actinolite for analysis. The TEM analysts were asked to provide 3 spectra and 3 indexed diffraction patterns from fibers they encountered during analysis. **Please see attachments EMSL2.**

SAED/EDXA study of Diopside (Herschel, Ontario)

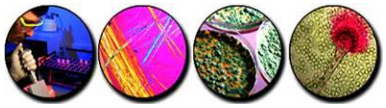
The Diopside sample was obtained from Ward's Science and provided to EMSL Libby and Cinnaminson courtesy of Doug Kent. Each TEM analyst was asked to provide 3 spectra and 3 indexed patterns of the Diopside. **Please see attachments EMSL3.**

Inter Lab EMSL QC

Seven samples were picked for QC. The samples were analyzed in accordance with Lab mod 29. The results of the inter-lab EMSL QC exchange are summarized below

EMSL Sample Number	Customer sample ID	Reprep Result	Interlab Result	Result
271300789-0004	4R-02146	1 NAM	1 NAM	Concordant
271300800-0002	4R-02123	1 FP	1 NAM	Discordant
271300675-0010	P3-00774	1 NC LA	1 NC LA	Concordant
271300675-0003	P3-00880	ND	ND	Concordant
271300573-0001	SM-10080	ND	1 NC LA	Concordant
271300838-0001	4R-01595	ND	ND	Concordant
271300764-0002	4R-02012	ND	ND	Concordant

The majority of the samples were concordant- two samples showed documentation errors and in one of those instances lead to a false positive. One sample was improperly counted at corporate and is



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discussed below.

For sample 271300573-0001 the incorrect fiber size recording rules were listed on the analytical worksheet. The analysis was for Low Magnification, PCME fibers only. However, the minimum fiber size listed on the analytical worksheet was 0.5 um.

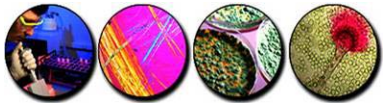
EMSL04 analyzed the sample at high magnification (~ 20,000 xs) and found 1 structure. When compared to the re-prep analysis it was noted that the sample was analyzed at 4800x and it became apparent that the sizing information was incorrect on the benchsheets provided. This sample was part of the wildfire scenario which was analyzed at EPAs request prior to the SAP being finalized. The Libby Lab did receive written direction from Christina Progess on how to proceed with analysis. However these instructions were not forwarded to Corporate during the internal QC exchange. The SAP summary that was forwarded stated that the recording rules for the sample could be found in the "OU3 ISO modification #3: Rapid Air Analysis". This modification could not be found in either the Libby e-room or the OU3 e-room. This instance has been used as a training session with the staff to ensure that at receiving all the counting rules and pertinent information is reviewed before the samples get back to the lab and once back to the lab analysis should not commence until the analyst has reviewed the SAP summary and all the referenced documents in the SAP summary.

For Sample 271300800-0002 1 LA structure was listed on the bench sheet and Verified GO Map in GO C2: C8. The EDXA spectra provided documented that the structure was located in GO C1:G8. This structure was not located during the inter-lab verified analysis in either grid opening listed on the bench sheet/verified map or EDXA. During the reconciliation, the structure was located in GO C2:G8. The improper documentation of this grid opening led to a false positive being recorded. Roy Pescador investigated and determined that the root cause was not completing the analytical worksheet correctly prior to moving to the next grid opening. A corrective action was implemented to ensure that the correct grid openings are recorded on all documentation. Going forward the analyst will ensure that directly upon moving to a new grid, the grid ID will be documented before proceeding to the next grid opening. Prior to recording the grid opening the analyst will switch to low magnification and ensure the GO ID. Once GO ID is confirmed the analyst will document it on the analytical worksheet. EMSL's corrective action form is attached to this letter. **Please see attachments EMSL4.**

If you need any further clarification, please don't hesitate to contact me.

Robyn Denton

Robyn Denton| *Special Projects Manager*



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ATTACHMENTS

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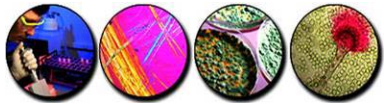
Attachment EMSL1

September 25th, 2013 Pre-training

Source	Dominant Mineral Types	Spectra	R. Pescador				E.Wyatt-Pescador				K.Colberg				R. Denton			
			LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K
SW01201	Tremolite, Actinolite	**B1**	√		**X**	**K**	√		**X**	**X**	√		**X**	**X**	√		**X**	**X**
		B2	√		**Na**	**X**	√		**Na**	**K**	√		**Na**	**X**	√		**X**	**X**
		B3	√		**X**	**K**	√		**X**	**X**	√		**Na**	**K**	√		**X**	**X**
		B4	√		**Na**	**K**	√		**Na**	**K**	√		**Na**	**X**	√		**X**	**X**
		B5	√		**X**	**K**	√		**X**	**K**	√		**Na**	**K**	√		**X**	**X**
		B6	√		**Na**	**X**	√		**Na**	**X**	√		**Na**	**K**	√		**X**	**X**
		B7	√		**X**	**K**	√		**Na**	**X**	√		**Na**	**X**	√		**X**	**X**
		B8	√		**Na**	**K**	√		**Na**	**K**	√		**Na**	**X**	√		**X**	**X**
		B9	√		**X**	**X**	√		**X**	**X**	√		**Na**	**X**	√		**X**	**X**
		B10	√		**Na**	**K**	√		**Na**	**K**	√		**Na**	**K**	√		**X**	**X**
SW01231	Tremolite, Actinolite,Winchite, Richterite	D1	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D2	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D3	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D4	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D5		√	**Na**	**K**		√	**Na**	**K**		√	**Na**	**K**	√		**Na**	**K**
		D6	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D7	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D8	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D9	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D10	√		Na	K	√		Na	K	√		Na	K	√		Na	K

Boldface text denotes discordances



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			LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K
SW1281	Richterite, Winchite	E1	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E2	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E3	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E4	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E5	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E6	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E7	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E8	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E9	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E10	√		Na	K	√		Na	K	√		Na	K	√		Na	K
SW01TR1	NIST Tremolite	G1	√		X	X	√		X	X	√		X	X	√		X	X
		G2	√		X	X	√		X	X	√		X	X	√		X	X
		G3	√		X	X	√		X	X	√		X	X	√		X	X
		G4	**√**		**Na**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**	**√**		**X**	**X**
		G5	**√**		**Na**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**	**√**		**X**	**X.**
		G6	√		X	X	√		X	X	√		X	X	√		X	X
		G7	**√**		**Na**	**X**	**√**		**Na**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**
		G8	√		X	X	√		X	X	√		X	X	√		X	X
		G9	**√**		**X**	**X**	**√**		**X**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**
		G10	**√**		**X**	**X**	**√**		**X**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**

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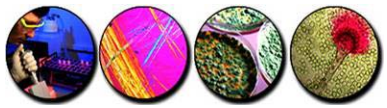

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Source	Minerals	Spectra	R. Pescador				E.Wyatt-Pescador				K.Colberg				R. Denton			
			LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K
SW01201	Tremolite, Actinolite	B1	√		X	X	√		X	X	√		X	X	√		X	X
		B2	√		Na	X	√		Na	X	√		Na	X	√		Na	X
		B3	√		X	X	√		X	X	√		X	X	√		X	X
		B4	√		X	X	√		X	X	√		X	X	√		X	X
		B5	√		X	X	√		X	X	√		X	X	√		X	X
		B6	**√**		**X**	**X**	**√**		**X**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**
		B7	**√**		**X**	**X**	**√**		**X**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**
		B8	√		X	X	√		X	X	√		X	X	√		X	X
		B9	√		X	X	√		X	X	√		X	X	√		X	X
		B10	**√**		**X**	**X**	**√**		**X**	**X**	**√**		**Na**	**X**	**√**		**X**	**X**
SW01231	Tremolite, Actinolite,Winchite, Richterite	D1	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D2	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D3	**√**		**Na**	**K**	**√**		**Na**	**K**	**√**		**Na**	**K**	**√**		**X**	**K**
		D4	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D5		**√**	**Na**	**K**		**√**	**Na**	**K**		**√**	**Na**	**K**	**√**		**Na**	K
		D6	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D7	√		Na	X	√		Na	X	√		Na	X	√		Na	X
		D8	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D9	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		D10	**√**		**Na**	**K**	**√**		**Na**	**K**	**√**		**Na**	**K**	**√**		**X**	**K**

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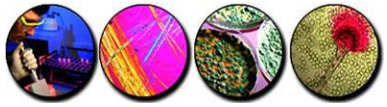

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FAX: (845) 231-6017

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Source	Minerals	Spectra	R. Pescador				E.Wyatt-Pescador				K.Colberg				R. Denton			
			LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K	LA	NAM	Na	K
SW1281	Richterite, Winchite	E1	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E2	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E3	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E4	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E5	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E6	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E7	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E8	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E9	√		Na	K	√		Na	K	√		Na	K	√		Na	K
		E10	√		Na	K	√		Na	K	√		Na	K	√		Na	K
SW01TR1	NIST Tremolite	G1	√		X	X	√		X	X	√		X	X	√		X	X
		G2	√		X	X	√		X	X	√		X	X	√		X	X
		G3	√		X	X	√		X	X	√		X	X	√		X	X
		G4	√		X	X	√		X	X	√		X	X	√		X	X
		G5	√		X	X	√		X	X	√		X	X	√		X	X
		G6	√		X	X	√		X	X	√		X	X	√		X	X
		G7	√		X	X	√		X	X	√		X	X	√		X	X
		G8	√		X	X	√		X	X	√		X	X	√		X	X
		G9	√		X	X	√		X	X	√		X	X	√		X	X
		G10	√		X	X	√		X	X	√		X	X	√		X	X

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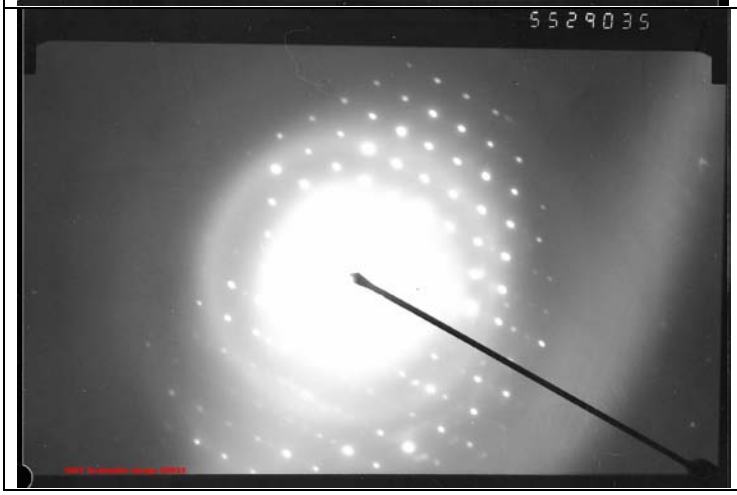
Attachment EMSL2

	*SAED IMAGE 29019* *NIST Actinolite* Interow 5.07 Angstroms Hko 5.02 Angstroms Hkl 4.76 Angstroms Slant Vector Angle 68° Zone Axis [3 1 2] *Camera Constant 22.82 mm/Angstroms* *SAED Reference JCPDS*
	*SAED IMAGE 29031* *NIST Actinolite* Interow 5.37 Angstroms Hko 9.13 Angstroms Hkl 4.56 Angstroms Slant Vector Angle 60° Zone Axis [1 0 0] *Camera Constant 22.82 mm/Angstroms* *SAED Reference JCPDS*
	*SAED IMAGE 29035* *NIST Actinolite* Interow 5.22 Angstroms Hko 5.02 Angstroms Hkl 2.56 Angstroms Slant Vector Angle 85° Zone Axis [3 -1 -10] *Camera Constant 22.82 mm/Angstroms* *SAED Reference JCPDS*

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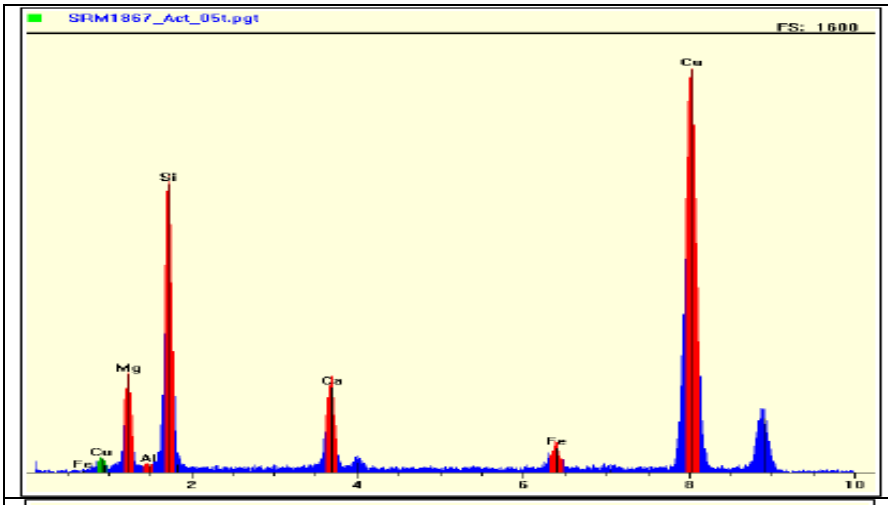
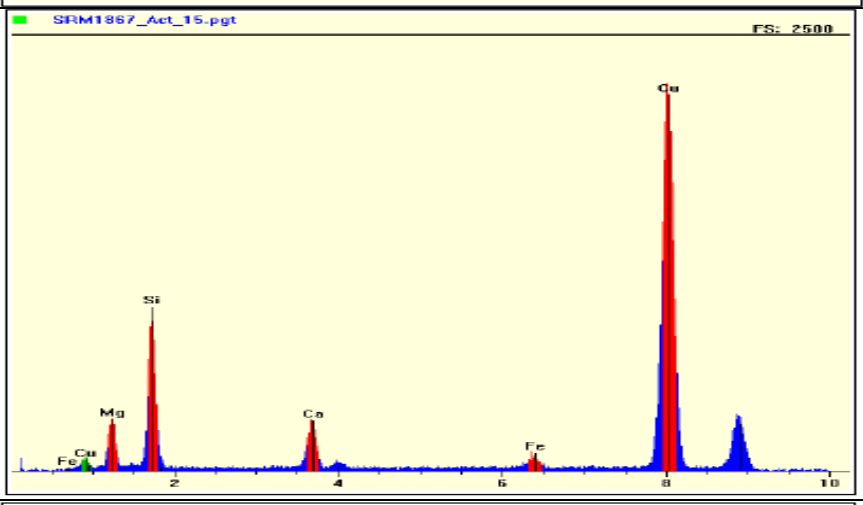
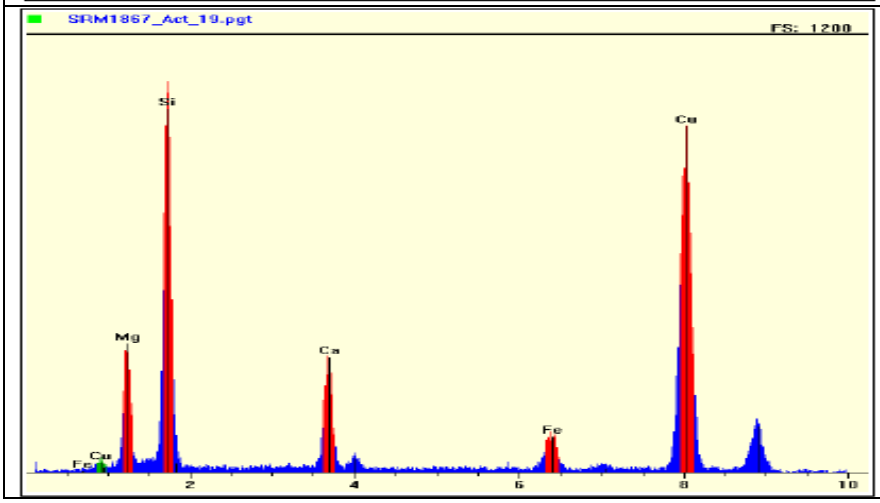
	*EDXA Spectra NIST Actinolite AC/XX* *Full scale 1600* *Corresponds to diffraction image 29019*
	*EDXA Spectra NIST Actinolite AC/XX* *Full scale 2500* *Corresponds to diffraction image 29031*
	*EDXA Spectra NIST Actinolite AC/XX* *Full scale 1200* *Corresponds to diffraction image 29035*

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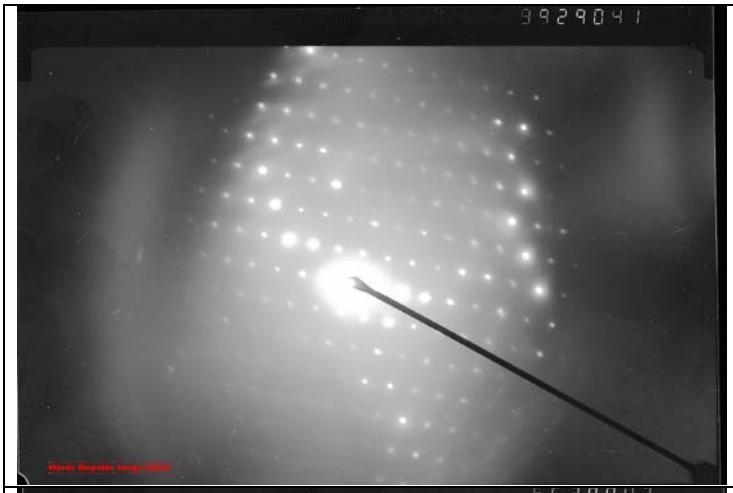
Attachment EMSL3

	*SAED IMAGE 29041* *Wards Diopside* Interow 5.19 Angstroms Hko 6.29Angstroms Hkl 4.99 Angstroms Slant Vector Angle 79° Zone Axis [-1 -1 0] *Camera Constant 22.82 mm/Angstroms* *SAED Reference JCPDS*
	*SAED IMAGE 29051* *Wards Diopside* Interow 5.27 Angstroms Hko 3.68 Angstroms Hkl 2.54 Angstroms Slant Vector Angle 85° Zone Axis [-4 2 2] *Camera Constant 22.82 mm/Angstroms* *SAED Reference JCPDS*
	*SAED IMAGE 29057* *Wards Diopside* Interow 5.22 Angstroms Hko 6.27 Angstroms Hkl 2.56 Angstroms Slant Vector Angle 80° Zone Axis [2 2 2] *Camera Constant 22.82 mm/Angstroms* *SAED Reference JCPDS*

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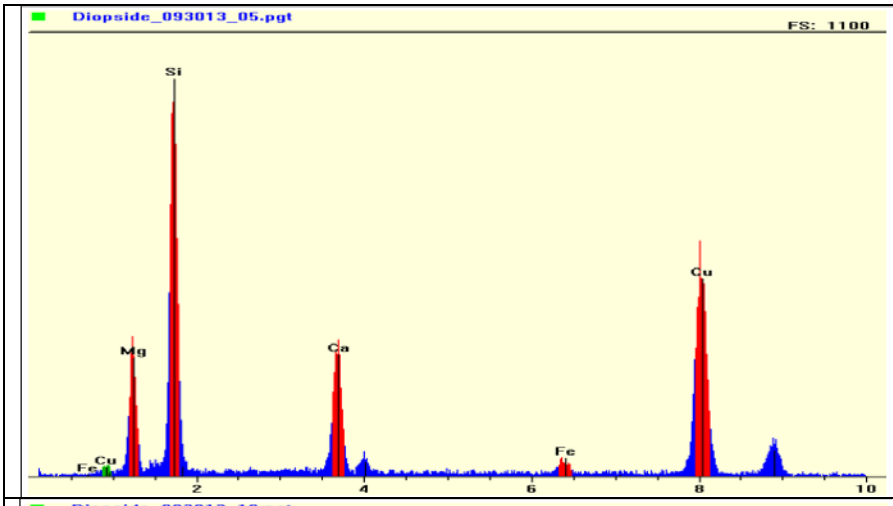
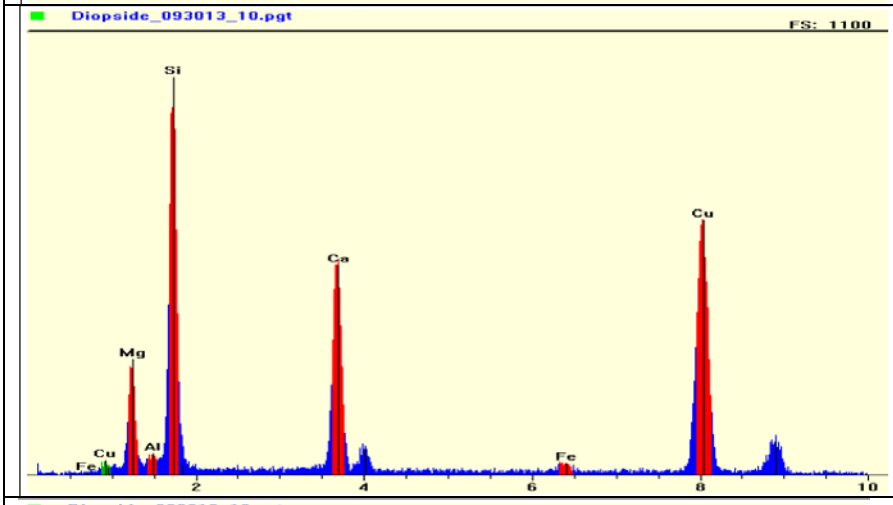
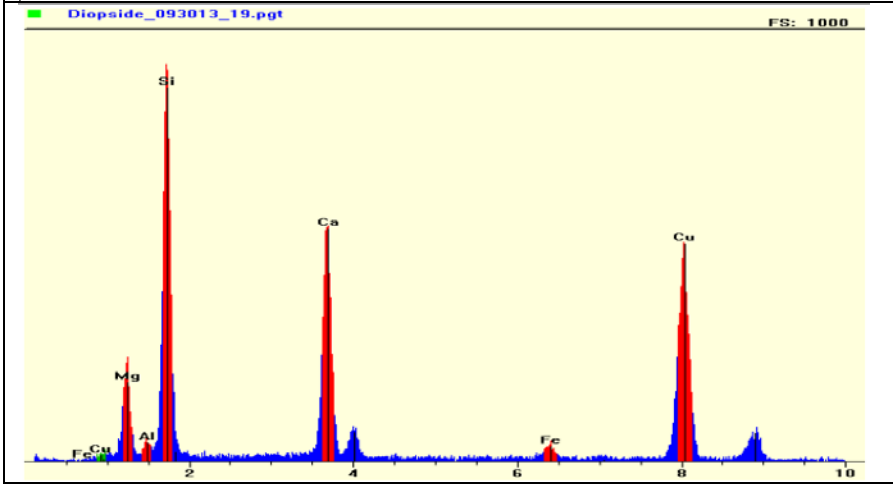
	*EDXA Spectra Diopside Wards PY/XX* *Full scale 1100* *Corresponds to diffraction image 29041*
	*EDXA Spectra Diopside Wards PY/XX* *Full scale 1100* *Corresponds to diffraction image 29047*
	*EDXA Spectra Diopside Wards PY/XX* *Full scale 1000* *Corresponds to diffraction image 29057*

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SUPPORTING DOCUMENTATION

RAW EDXA SPECTRA NAK
LA SPECTRA INTERPRETATION TRAINING RECORDS
EDXA NIST ACTINOLITE
EDXA WARDS DIOPSIDE
SAED INDEXING FORMS
INTRA LAB QC RESULTS

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EMSL TRAINING RECORD

Employee: EXAMPLE

Title / Position:

Laboratory: Libby

Date of Training:

Trainer: Robyn Denton

Signature of Trainer:

Department: Asbestos

Topic: Libby Amphibole EDXA Collection and Interpretation

Details Of Training:

Robyn Denton visited the lab to discuss the collection of EDXA collection and Interpretation. During the training the Libby Amphibole standards were used. According to the SRC (Syracuse Research Center) these standards are from the following locations and contain the following minerals. These standards were used for the Libby Amphibole Spectra study in 2002.

Sample Number	Source	Primary Amphibole Components
SW01201	Libby mine (site 20)	Tremolite, Actinolite
SW01281	Libby mine (site 28)	Richterite, Winchite
SW01231	Libby mine (site 23)	Tremolite, Actinolite, Richterite, Winchite
SW01TR1	NIST	Tremolite

To Obtain a spectra:

Once the sample has been inserted, choose an intact grid opening.

- Attain eucentric position.
- Tilt to +32º to +35º
- Switch to an appropriate spot size. The appropriate spot size decision is made by taking into account the following.
  - The spot size should be able to produce a sufficient amount of x-ray counts to allow for adequate peak acquisition while not “flooding” the detector.
  - Sufficient x-ray counts are optimally 2000 counts per second. Change to a larger spot size if the counts are substantially lower than 2000 c/s.
  - “Flooding” the detector occurs when the amount of x-rays overwhelms the detector and the processor software producing a high dead time.
  - A high dead time is defined differently on different scope / detector combinations. In general:
    - For older scope / detector combinations “high” is when the deadtime exceeds about 20%
    - High deadtimes cause the detector to ignore a large percentage of x-rays that hit the window and the spectrum may be distorted.

Spectrum Collection Times:

- Collection time may vary depending on particle thickness, size and location. EMSL typically tries to collected until 1000 counts are reached in the Silicon peak.

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- Note: The FS (full scale) count in PGT is referring to the highest peak in the spectrum, which when you are close to a grid bar could be Cu. So be sure to scale your spectrum appropriately.

- The longer the collection time the lower the background.

- Collection times <1000 counts may be used if the spectrum that is being generated has a low, flat background and distinct peaks in the Na and K regions.

To decrease the amount of deadtime, you can:

· Switch to a smaller spot size if the deadtime is substantially above the optimal values above.
· For PGT users, adjust the LLD . Under Xray setup, ADC tab, adjust the LLD to a value near 1.50. Collect a spectrum and see if the dead time has been lessened. Once you are comfortable with the settings, insert NIST Crocidolite and collect a spectrum. Determine your Na sensitivity.
·

Selecting a Spot Size:

· The size of the fiber/ particle will affect the choice of spot size. In general larger fibers (usually amphibole) will require the selection of a smaller spot size, while smaller fibers (chrysotile fibrils) require larger spot sizes.

· A trade off exists when choosing larger spot sizes.
- The larger the spot size, the larger the area you are sampling.
- If there are other particles present close to the particle of interest and you choose a large spot size, then the x-ray spectrum will exhibit characteristic x-rays from both the particle of interest and also nearby particles.

Interpreting/ Analyzing the spectrum

· The spectrum is a histogram, with the x-axis being the energy (KeV) and the Y-axis being the number of x-rays counted.
- Each elemental x-ray will have a characteristic energy, that energy is measured by the detector.
- The x-ray's energy is then plotted on the graph as one count, at the appropriate energy.
- By plotting all x-rays, the graph will reveal peaks, energies that have a high numbers of counts, that can be identified as belonging to particular elements.

· Qualitative analysis consists of identifying the peaks present, using the software accompanying the detector processor. In general software can identify peaks in two ways:
- By producing a line of interest and offering possible elemental matches for the line. The line can be moved to a peak of interest, possible elemental identifications for the peak are then offered.
- Expected elements can be set, and their peak locations highlighted, so that any peak that happens to be present in this area is possibly from this element.

· Semi-quantitative analysis is the process of comparing these spectrums, against known standard spectrum, to generate a possible matched identification.

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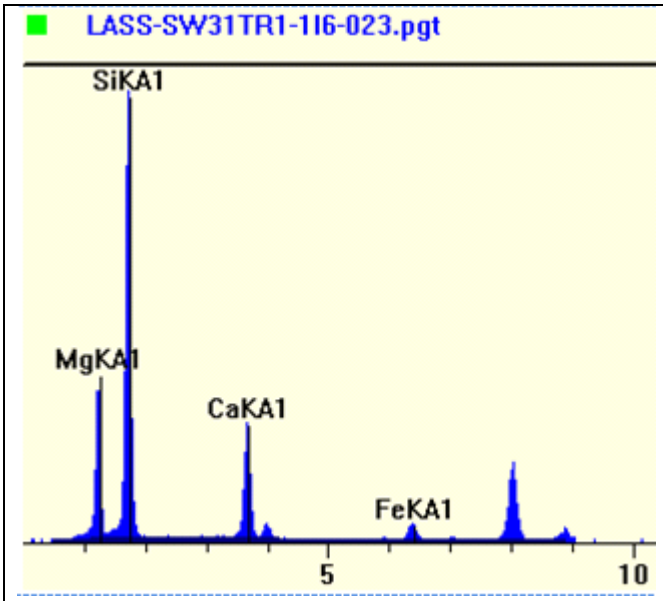
Libby Amphibole Identification

LA particles are characterized by the presence of sodium, magnesium, potassium, calcium and iron. Aluminum is usually absent, but may occur at low levels in some structures. The use of EDS to classify an amphibole particle as LA is complicated by a number of factors, including a) inherent variability in chemical composition of different LA particles, b) dependence of the spectrum on random variables such as particle thickness, orientation, and proximity to other particles (back scatter), and c) variation between instruments in sensitivity to different elemental constituents, d) the presences of pyroxenes in the Rainey Creek Geologic Complex. Pyroxenes are chemically similar to LA qualitatively. Analysis of the Atomic formula can aid in providing identification, but require much data manipulation is only available on certain EDXA systems.

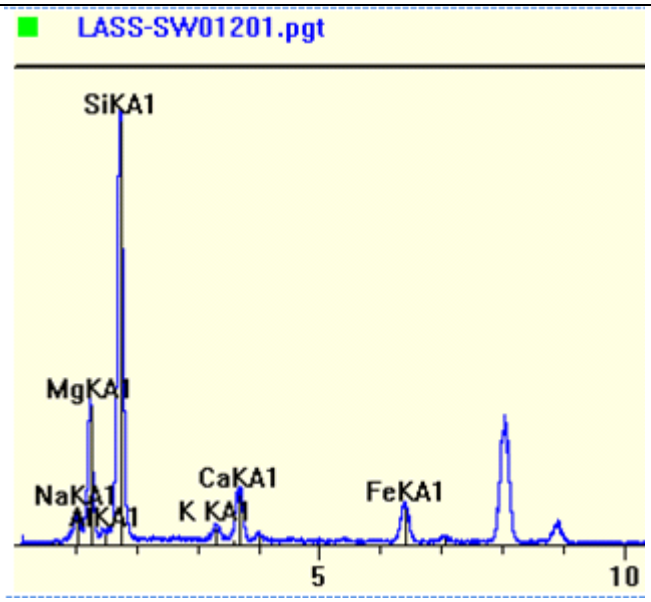
For these reasons, it is not possible to define a unique EDS spectrum for LA particles.

As noted above, there is substantial variability between particles and between instruments, but according to CHARACTERISTIC EDS SPECTRA FOR LIBBY-TYPE AMPHIBOLES dated March15, 2005 and prepared by SRC the following peak magnitudes (relative to silicone) are typical for Libby Amphibole. These values should not be interpreted as absolute values for classifying LA; there is too much variability amongst particles and scopes. This should cover the majority of the LA encountered during analysis. Any structure that falls outside these bounds may still be LA, but will need more corroboration before being fully indentified. (Morphology, diffraction) A spectrum from each standard is below. These spectra were collected on scope 27-2 in 2002.

Element	Typical Peak Magnitude		
	Mean	5th	95th
Na	0.36	0.15	0.64
Mg	3.08	2.47	3.49
Al	0.08	0.00	0.27
Si	10.00	10.00	10.00
K	0.25	0.06	0.53
Ca	1.81	0.96	2.63
Fe	1.08	0.57	1.88



Primary Amphibole Components: Tremolite



Primary Amphibole Components: Tremolite, Actinolite

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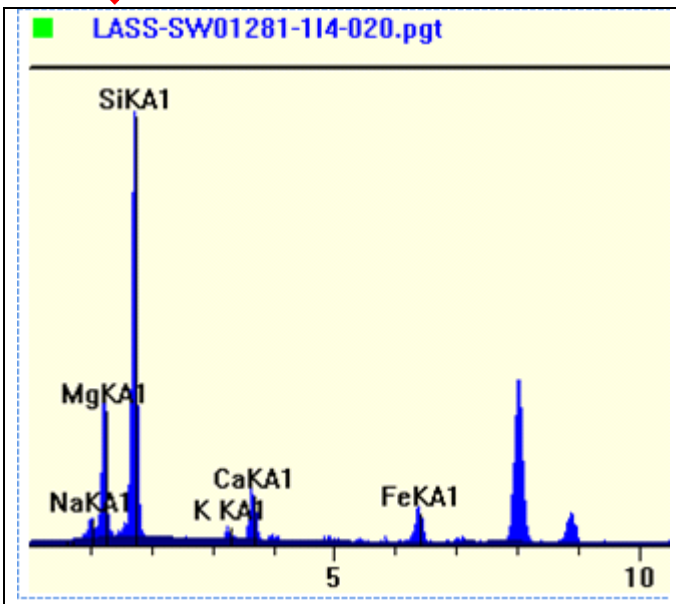
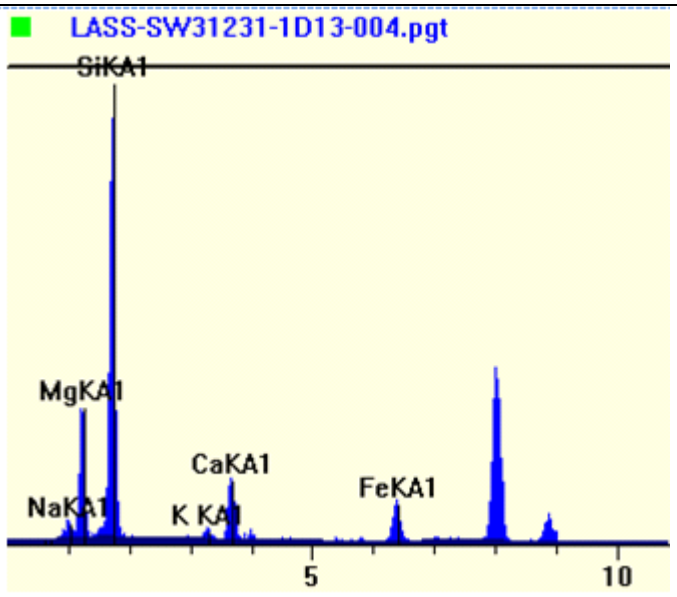


Primary Amphibole Components: Richterite, Winchite



Primary Amphibole Components: Tremolite, Actinolite, Richterite, Winchite

To determine Na / K presence:
Per lab mod 66 C every structure identified as LA needs to have the presence of Na or K documented. In order to determine, an analyst will evaluate the spectra and determined if the Na or K is present in a statistically stable amount above background. A small peak should be present, thus reflecting that the element has a high number of counts and can be statistically valid. A ratio of a particular element to Silicon can be used and compared to the above the table. Lastly, care must be taken when observing Na, as the Cu L alpha overlaps the Na K alpha peak. We need to be certain that any Quantitative analysis exclude Cu L alpha counts.

Lab mod 66 E states that the Na or K must be clearly present. A little blip of K or Na is not clearly present and therefore should not be labeled as such.

Lab Mod 66 E has many spectra present that can be used as references. It is important to remember that these spectra were taken on different detector than what we use and our own detectors may vary slightly from the examples.

Energy Dispersive X-Ray Analysis
Qualitative Spectrum

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\sw01201\B01.pgt
Collected: September 24, 2013 08:31:54

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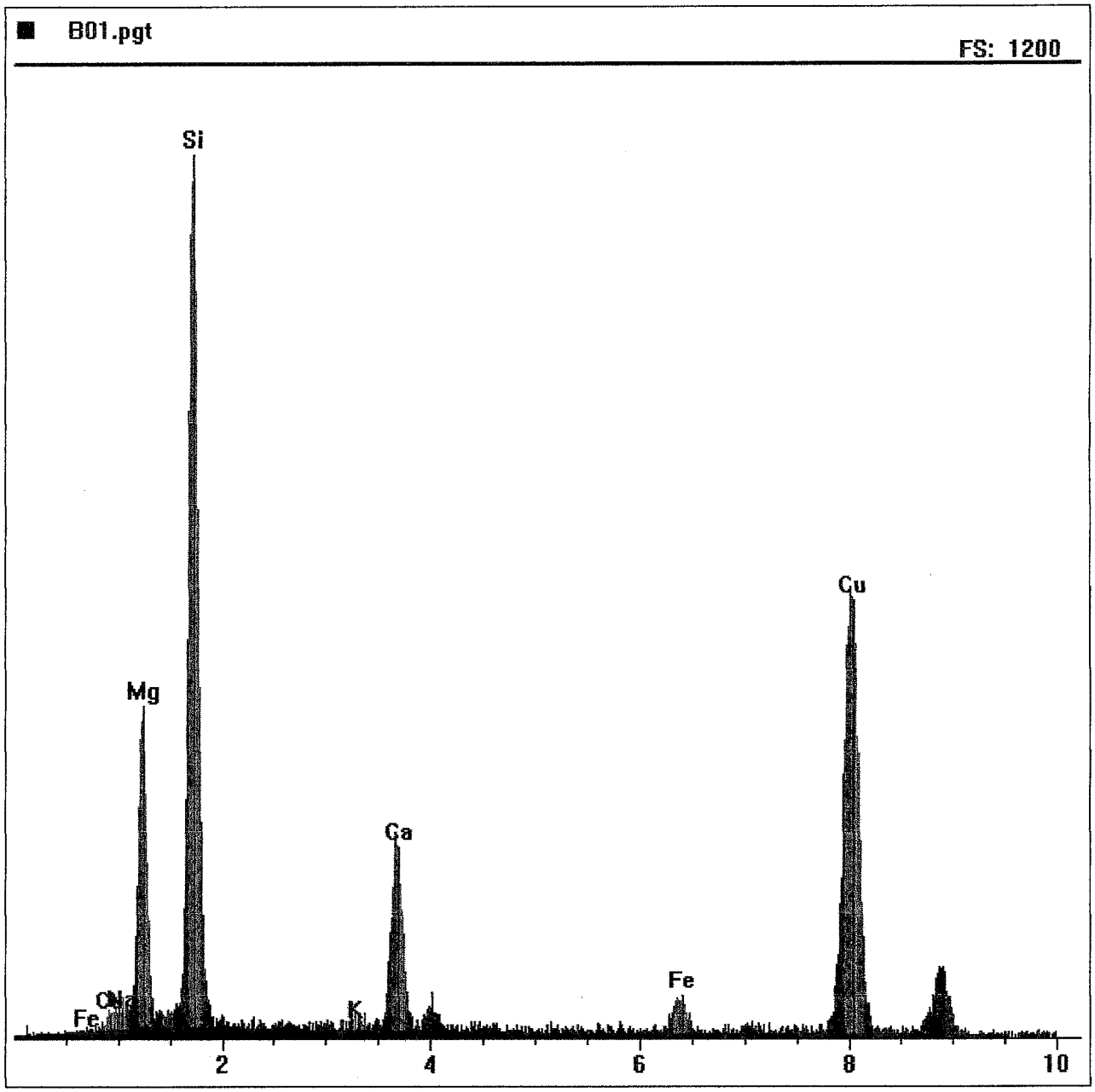

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Qualitative Spectrum

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\sw01201\B02.pgt
Collected: September 24, 2013 08:31:54

Live Time:	74.96	Count Rate:	1989	Dead Time:	21.99 %
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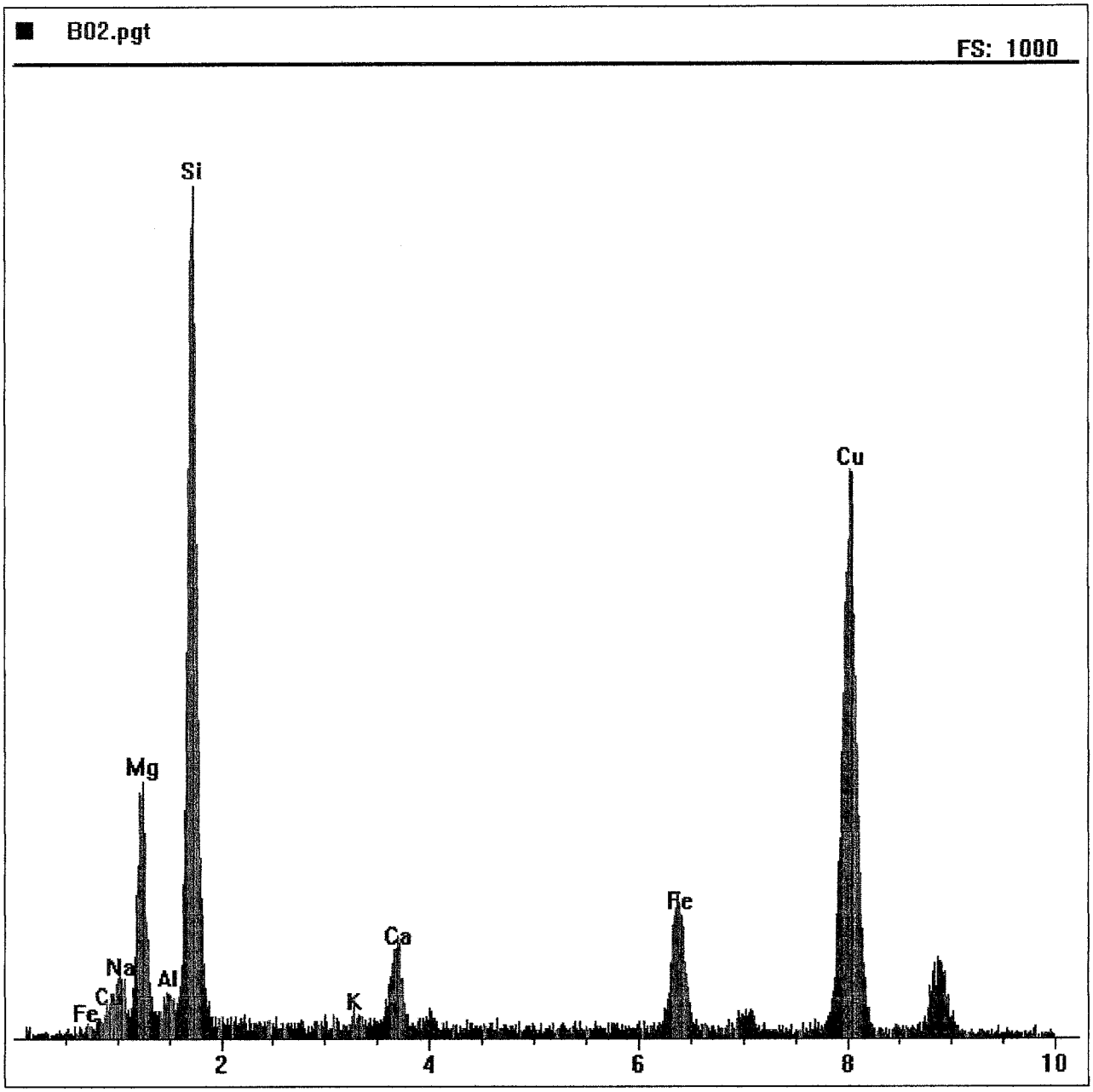

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Collected: September 24, 2013 08:56:43

Live Time:	319.14	Count Rate:	717	Dead Time:	10.38 %
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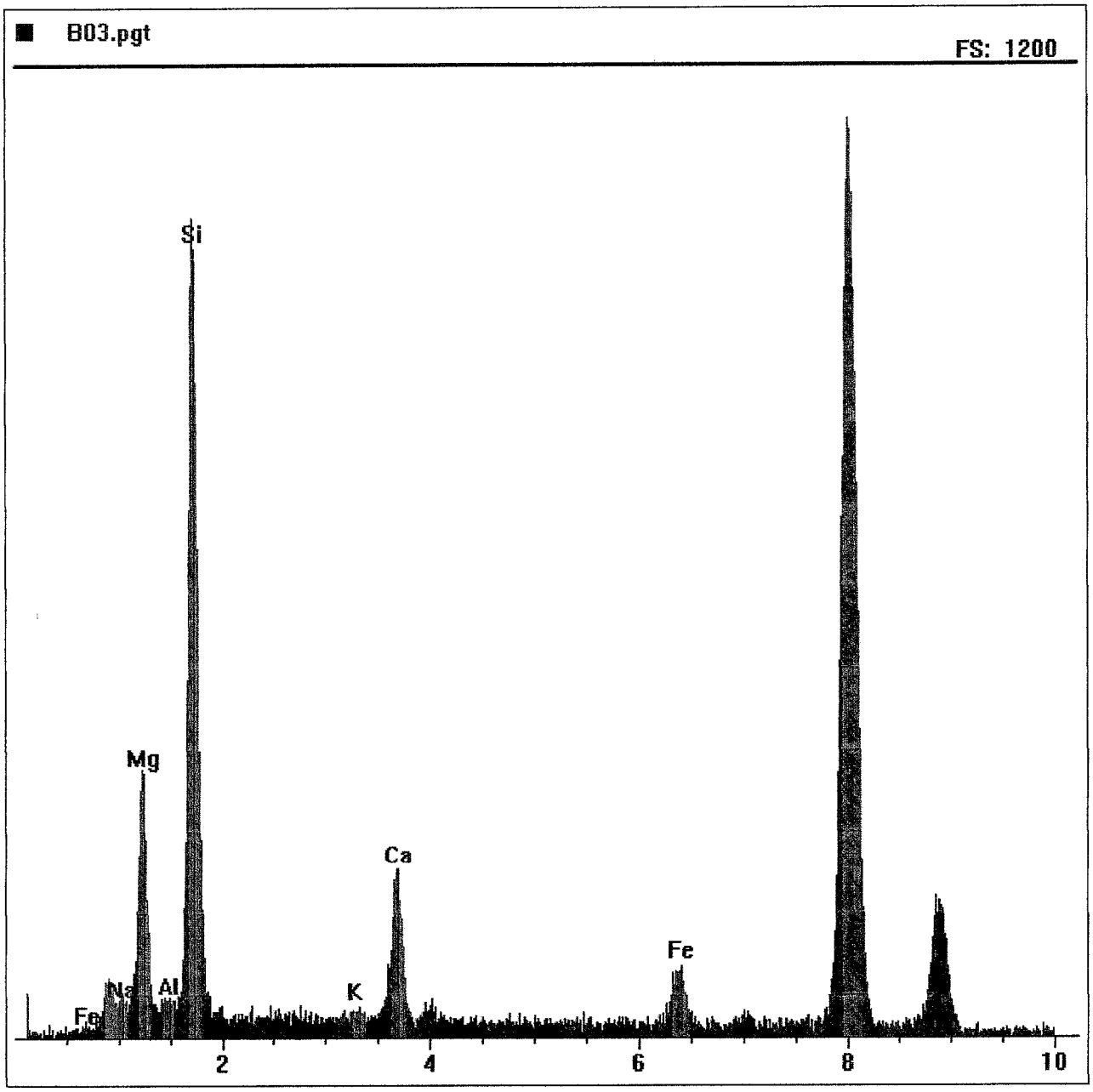

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Collected: September 24, 2013 09:10:50

Live Time:	100.36	Count Rate:	4453	Dead Time:	40.52 %
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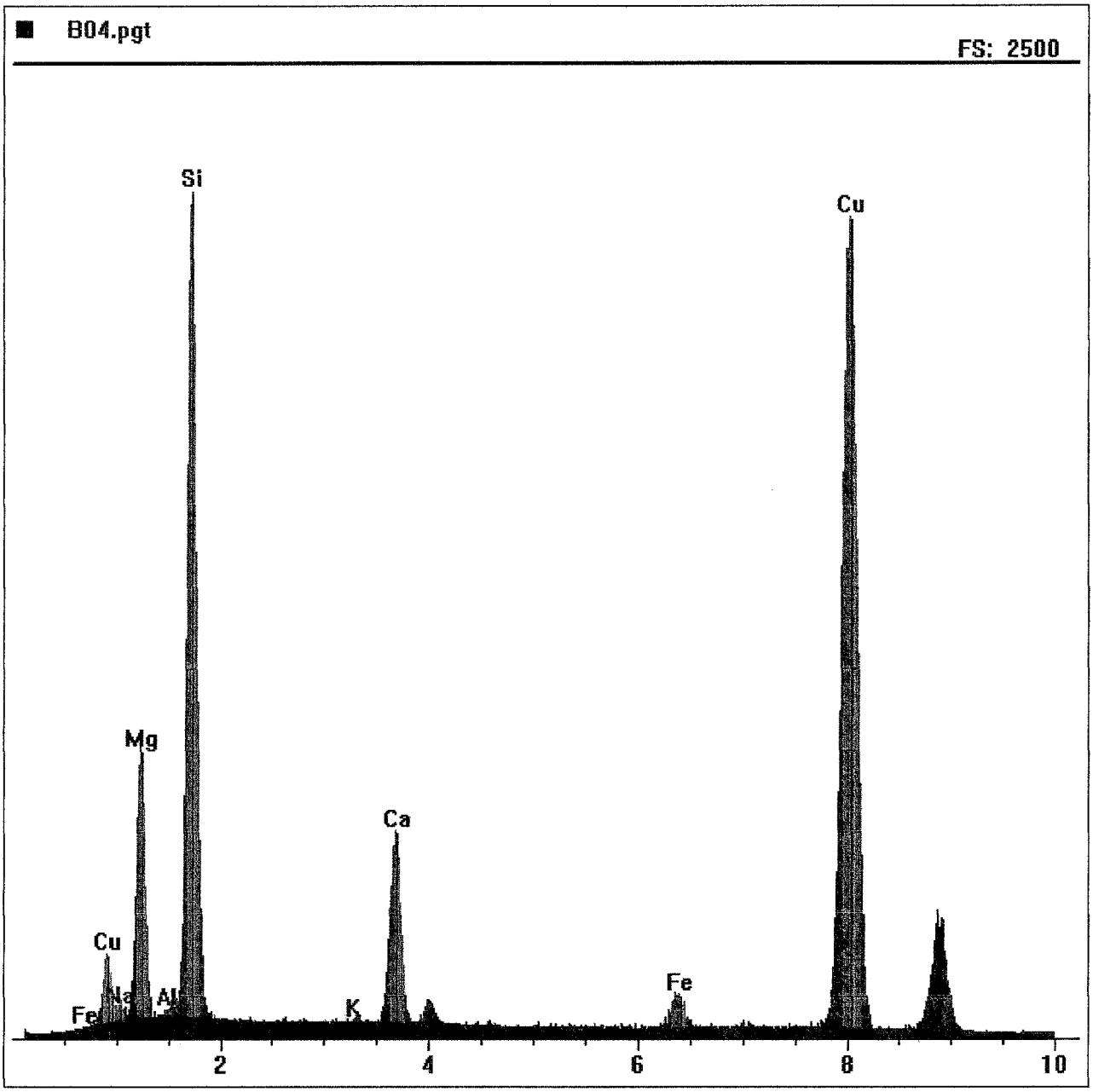

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\sw01201\B05.pgt
Collected: September 24, 2013 09:10:50

Live Time:	50.82	Count Rate:	3764	Dead Time:	35.16 %
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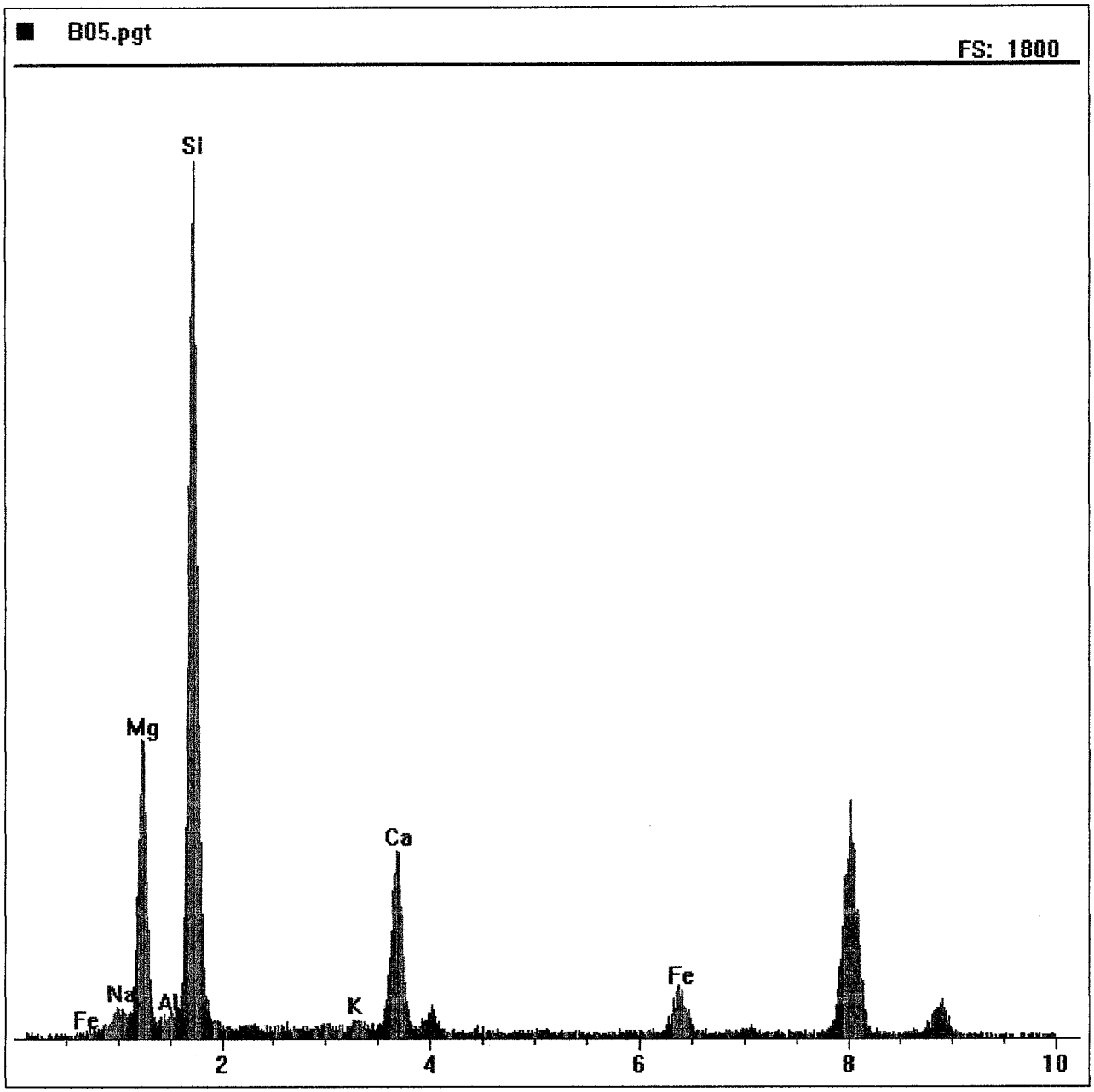

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Collected: September 24, 2013 09:10:50

Live Time:	176.33	Count Rate:	974	Dead Time:	12.41 %
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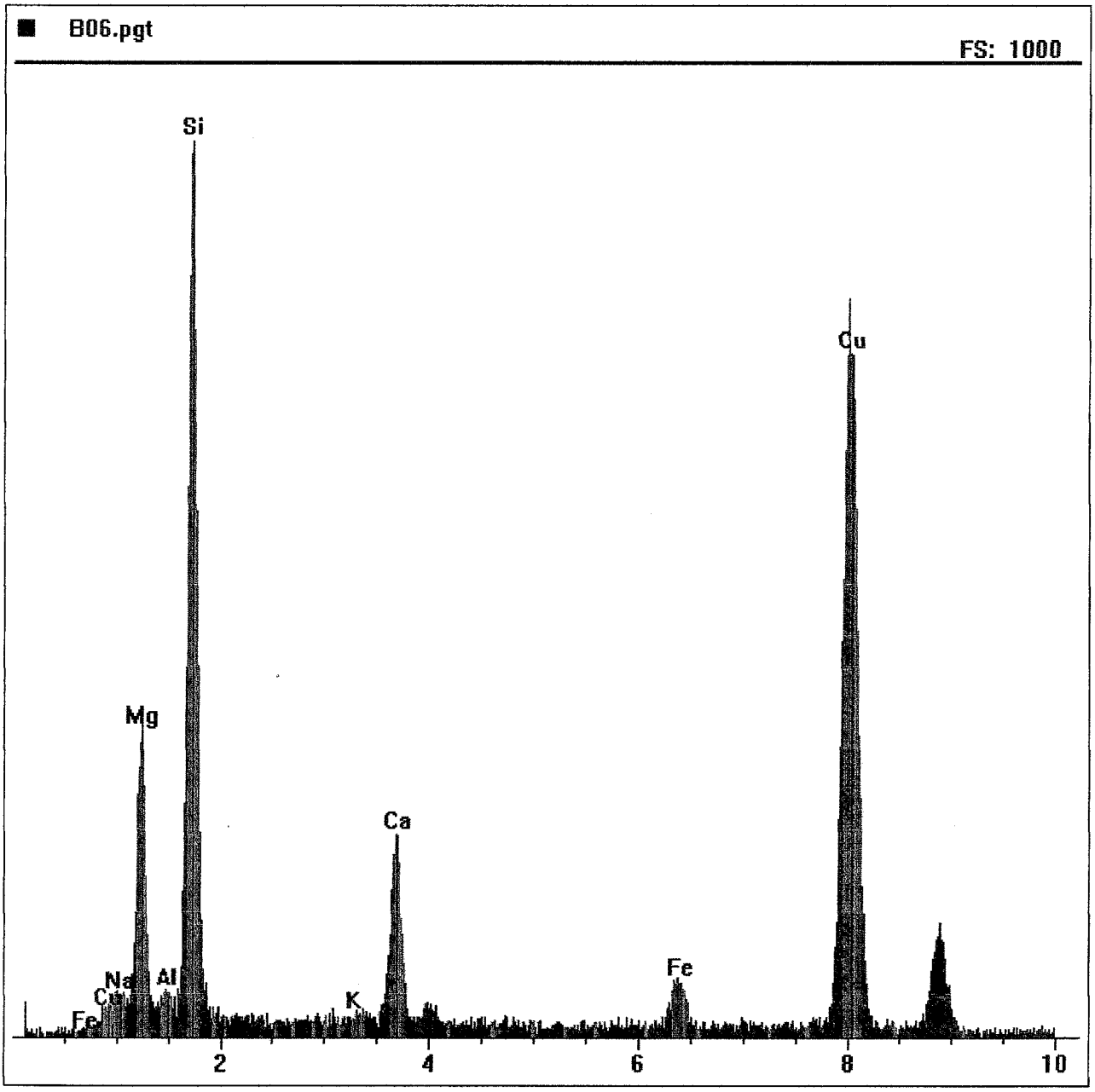

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Collected: September 24, 2013 09:10:50

Live Time:	56.10	Count Rate:	2114	Dead Time:	22.47 %
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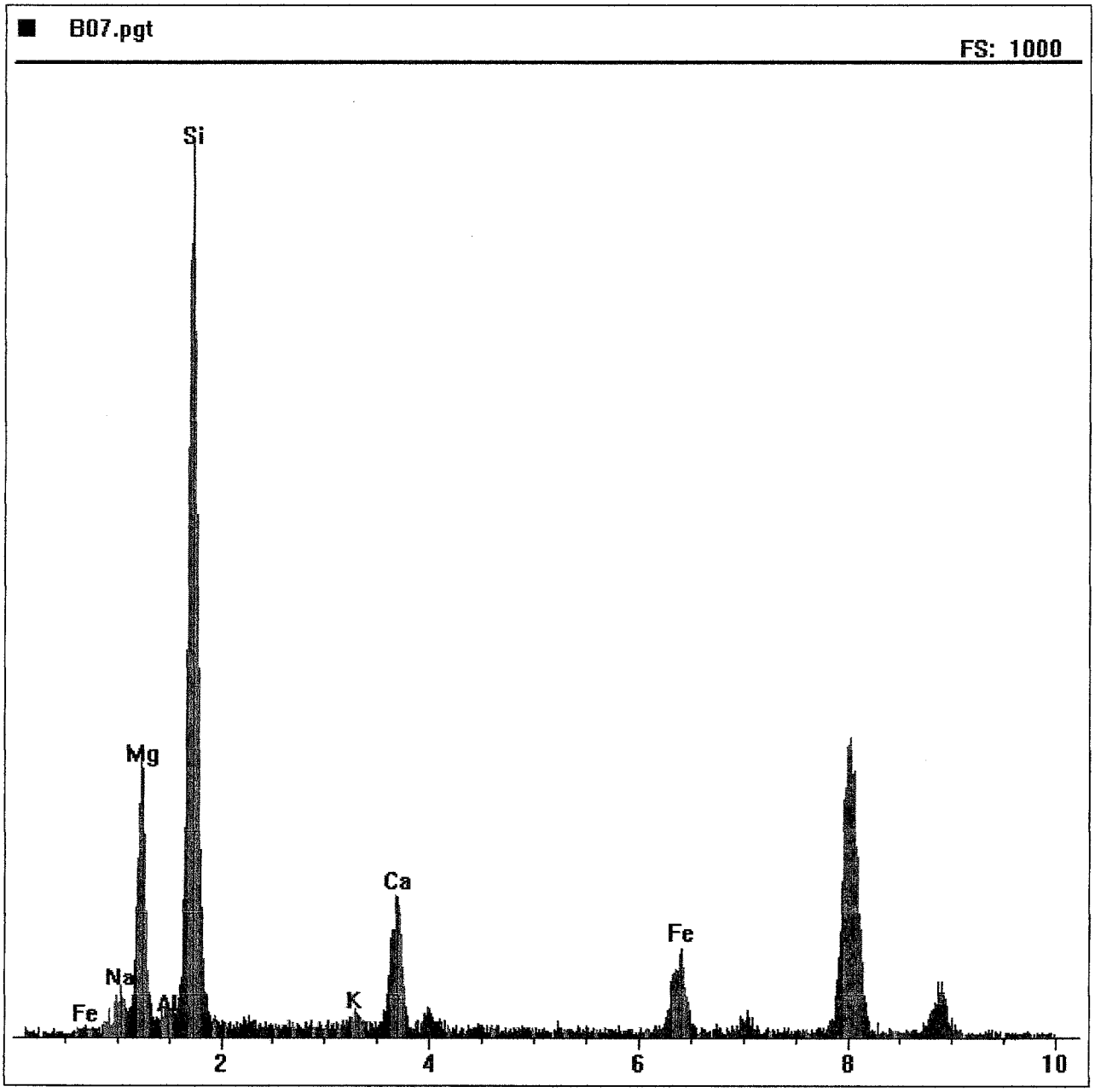

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\sw01201\B08.pgt
Collected: September 24, 2013 09:10:50

Live Time:	56.62	Count Rate:	3559	Dead Time:	33.49 %
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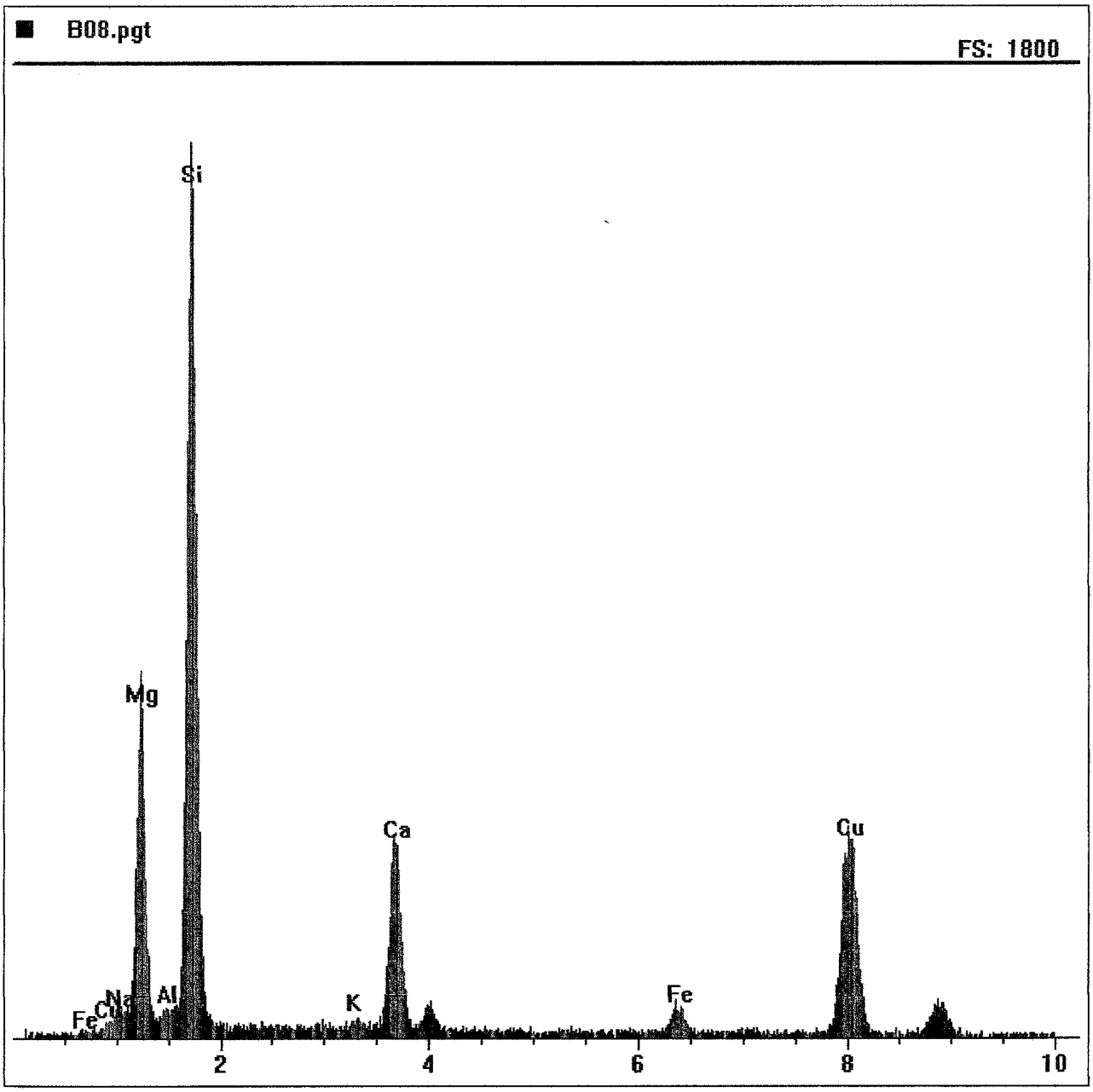

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\sw01201\B09.pgt
Collected: September 24, 2013 09:10:50

Live Time:	393.64	Count Rate:	258	Dead Time:	4.95 %
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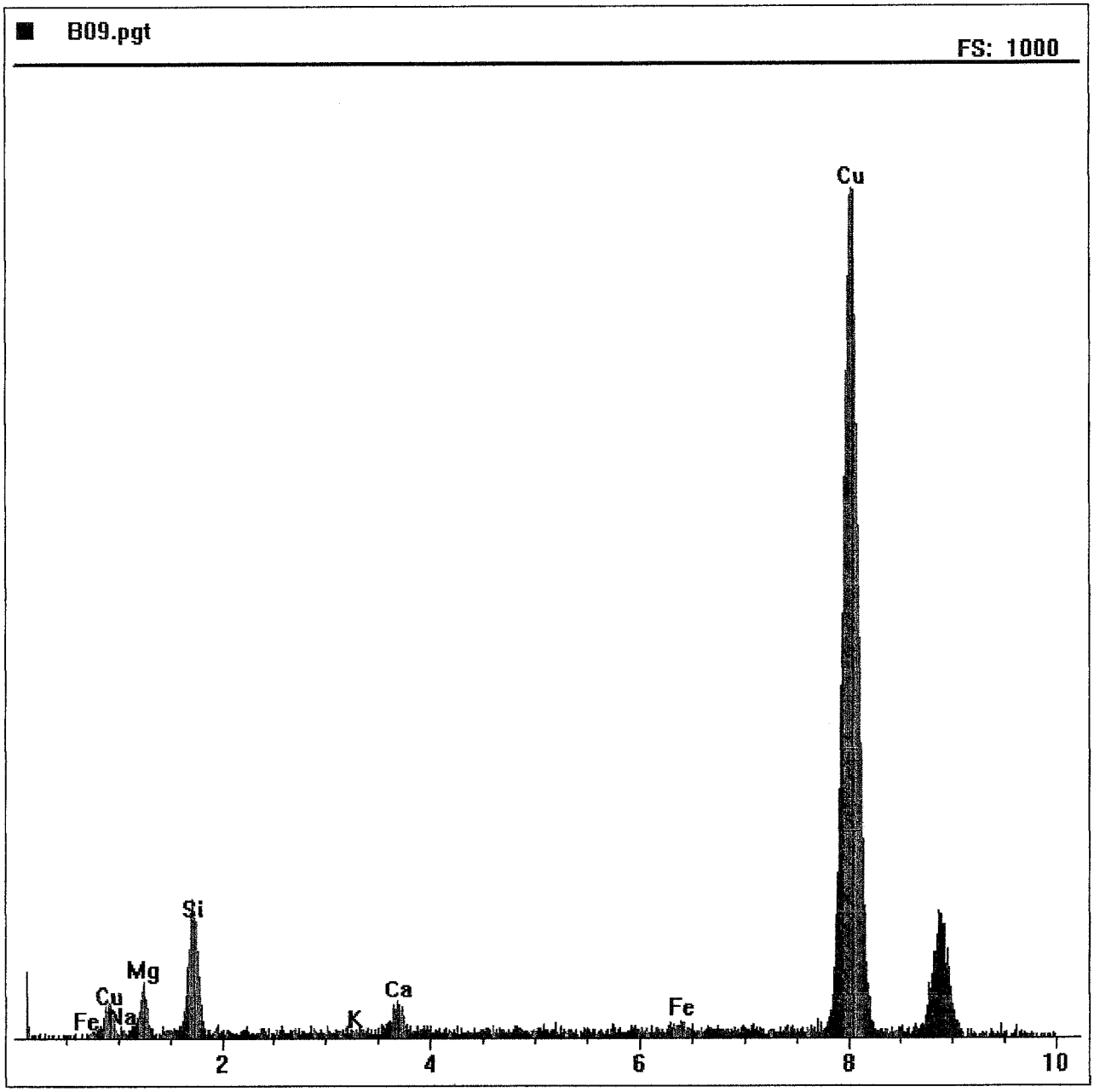

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Collected: September 24, 2013 09:10:50

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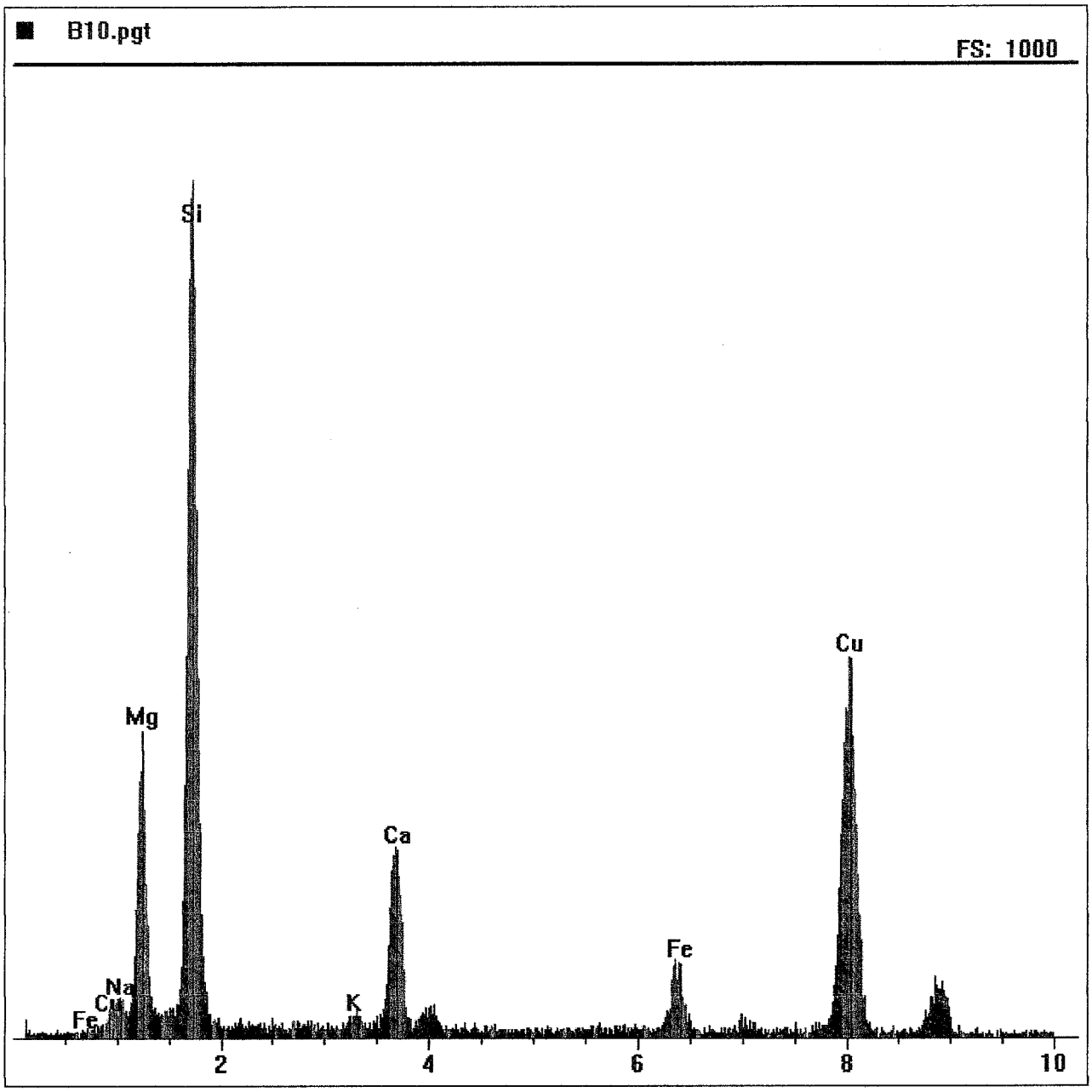

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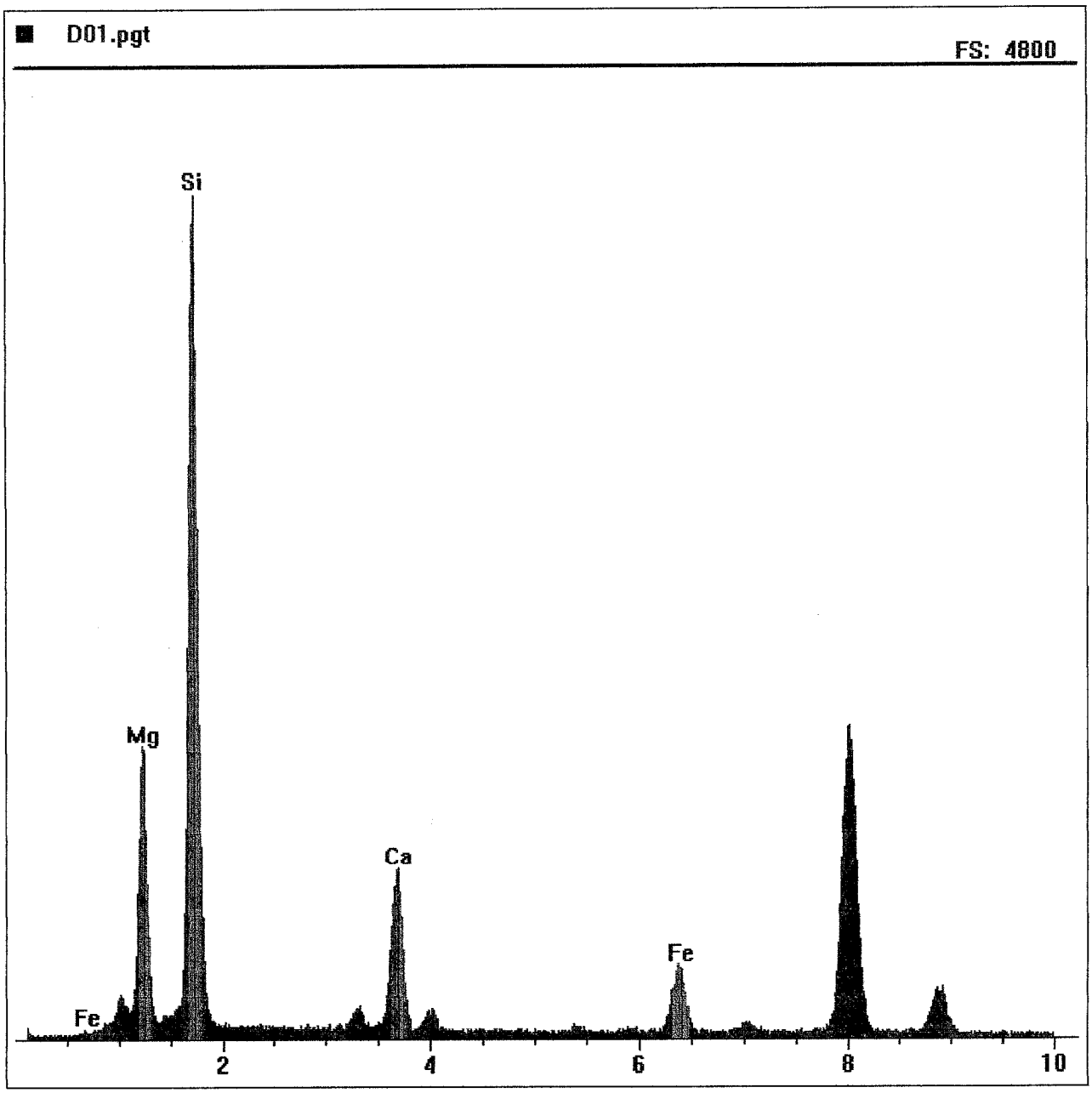
File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D01.pgt
Collected: September 24, 2013 09:40:13

Live Time:	162.75	Count Rate:	3645	Dead Time:	34.74 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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Qualitative Spectrum

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D02.pgt
Collected: September 24, 2013 09:40:13

Live Time:	281.14	Count Rate:	2478	Dead Time:	26.69 %
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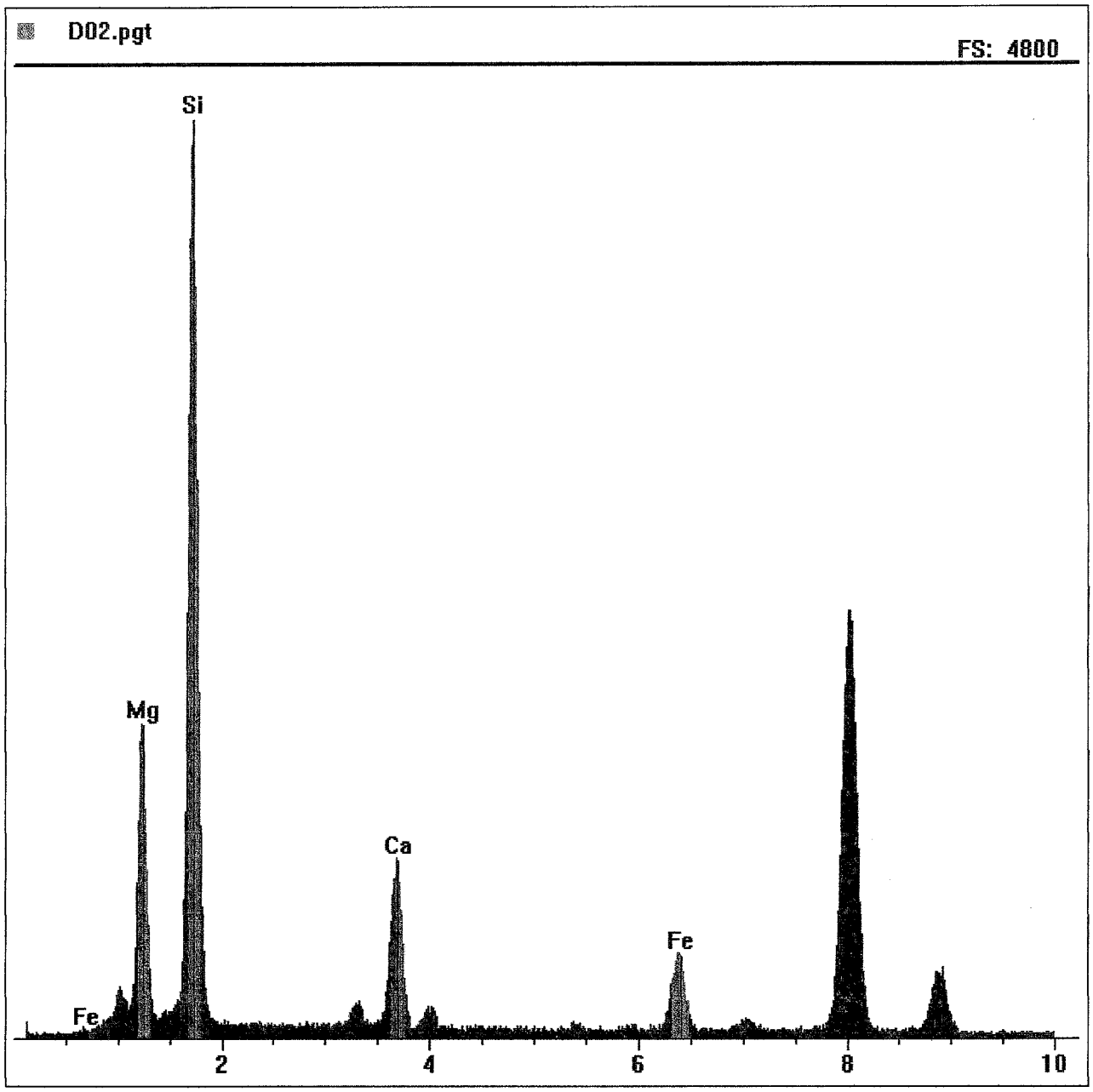

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D03.pgt
Collected: September 24, 2013 09:48:02

Live Time:	272.30	Count Rate:	424	Dead Time:	6.98 %
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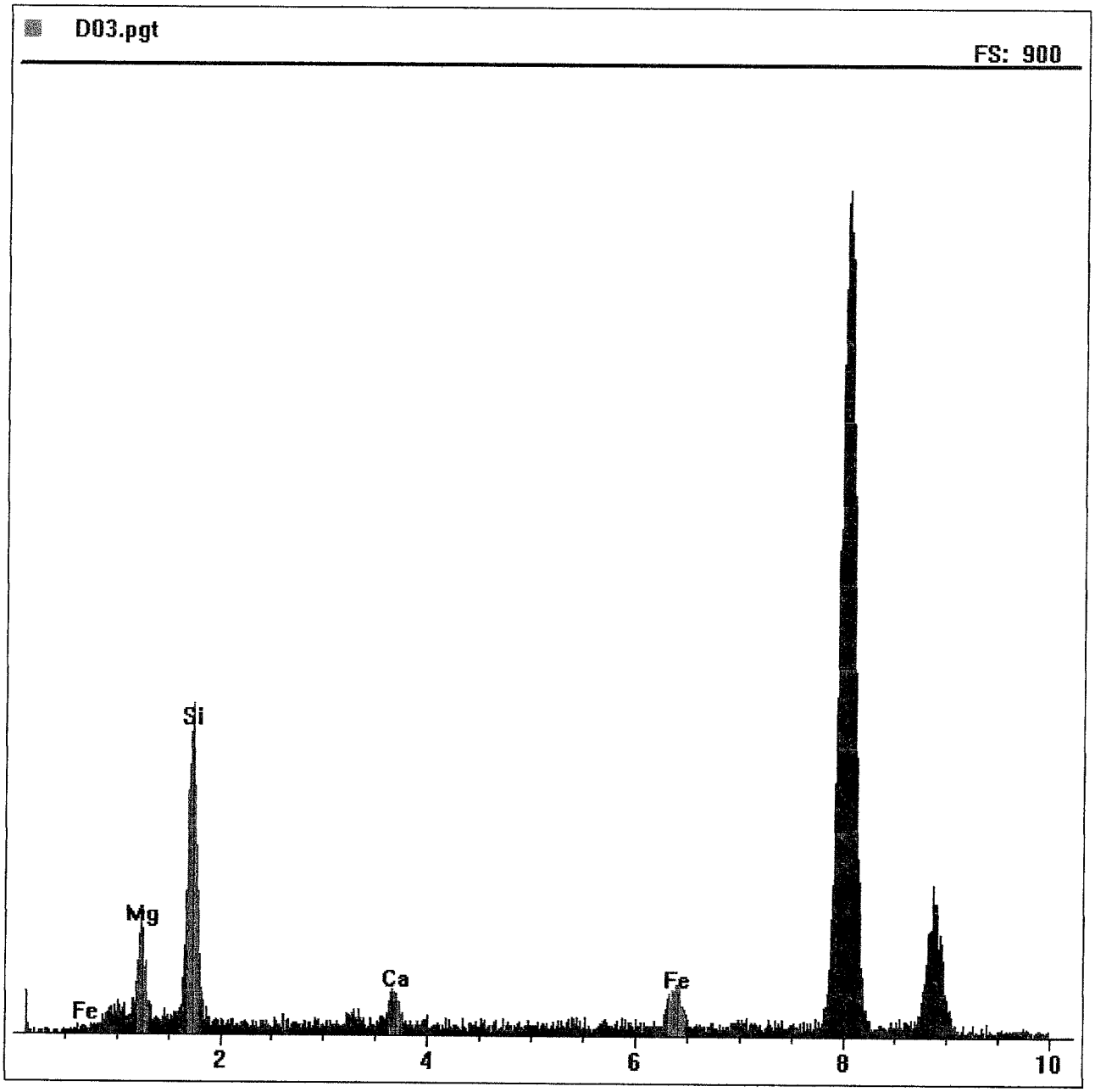

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File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D04.pgt
Collected: September 24, 2013 09:48:02

Live Time:	150.91	Count Rate:	2011	Dead Time:	23.05 %
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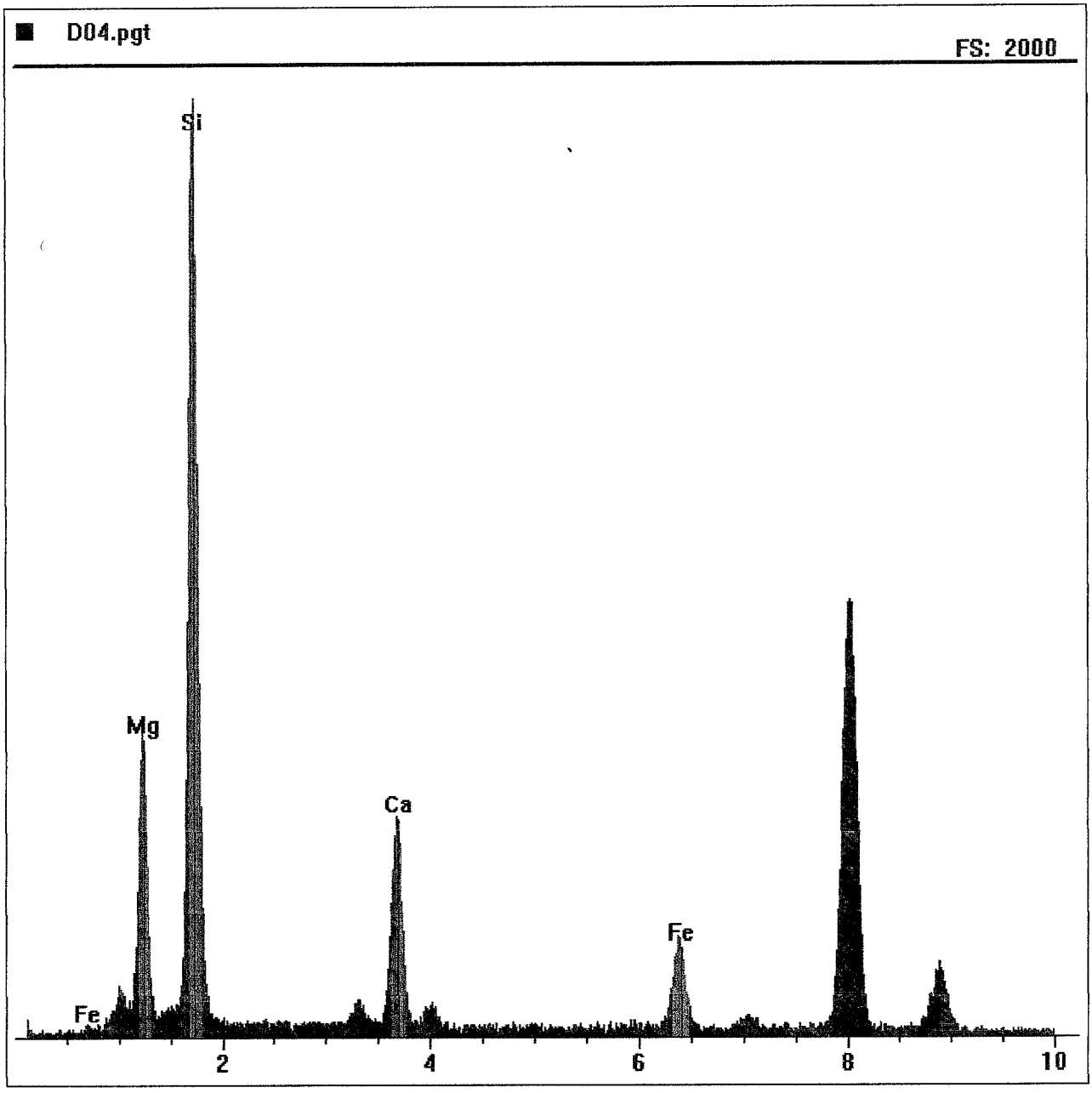

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Qualitative Spectrum

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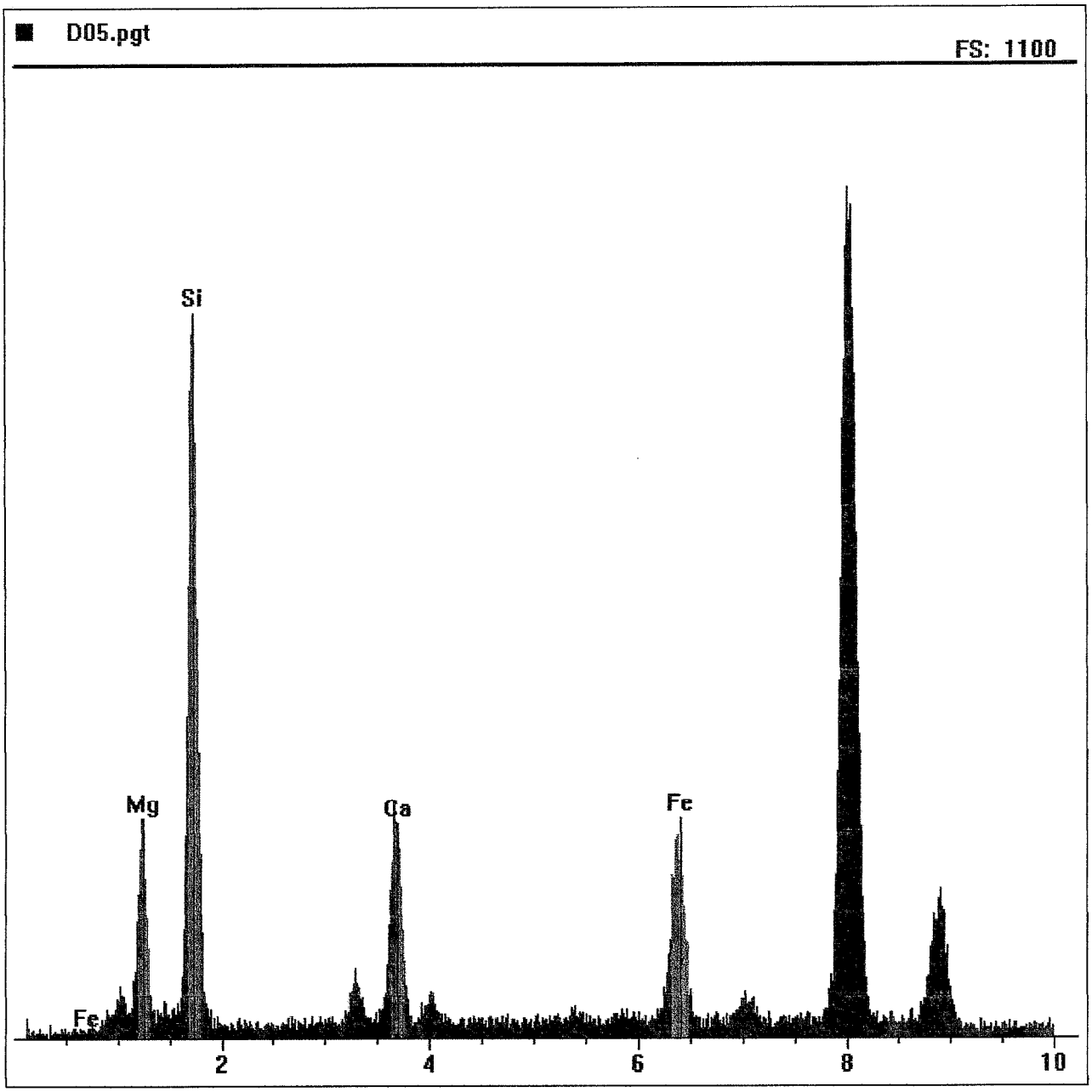
File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D05.pgt
Collected: September 24, 2013 09:48:02

Live Time:	117.84	Count Rate:	1863	Dead Time:	22.72 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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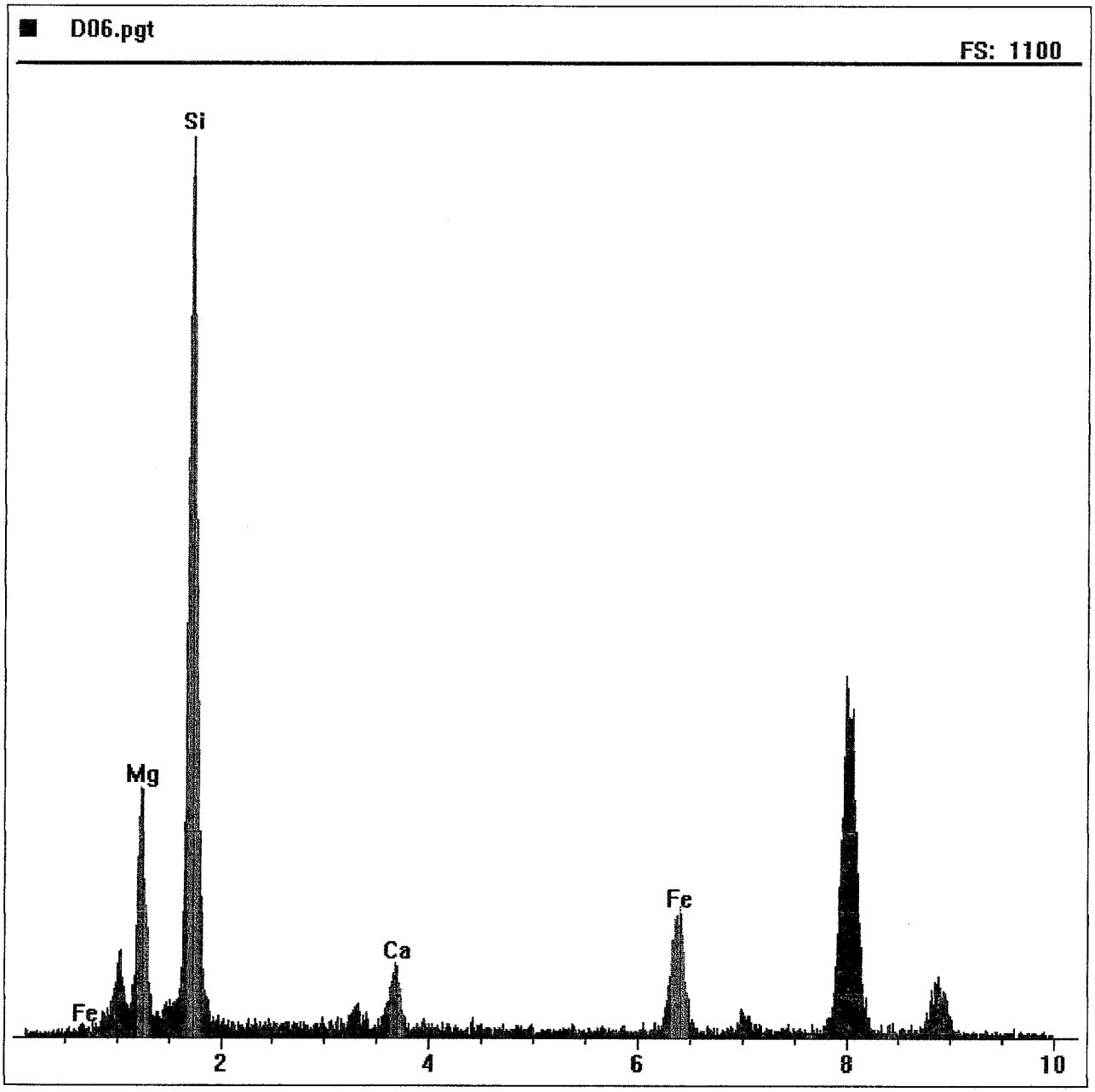
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D06.pgt
Collected: September 24, 2013 09:48:02

Live Time:	74.78	Count Rate:	1883	Dead Time:	20.75 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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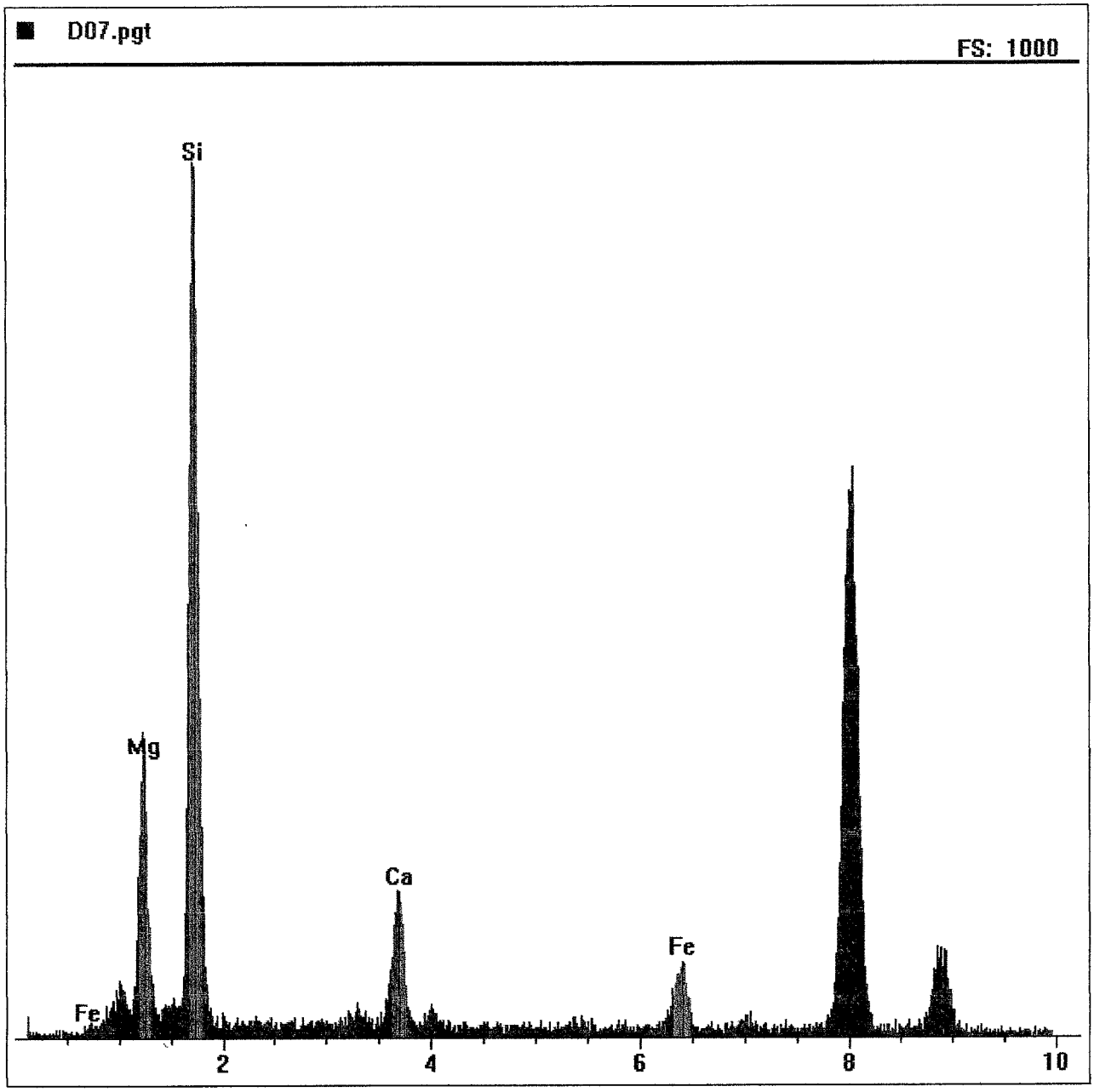
File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D07.pgt
Collected: September 24, 2013 09:48:02

Live Time:	119.62	Count Rate:	1284	Dead Time:	15.29 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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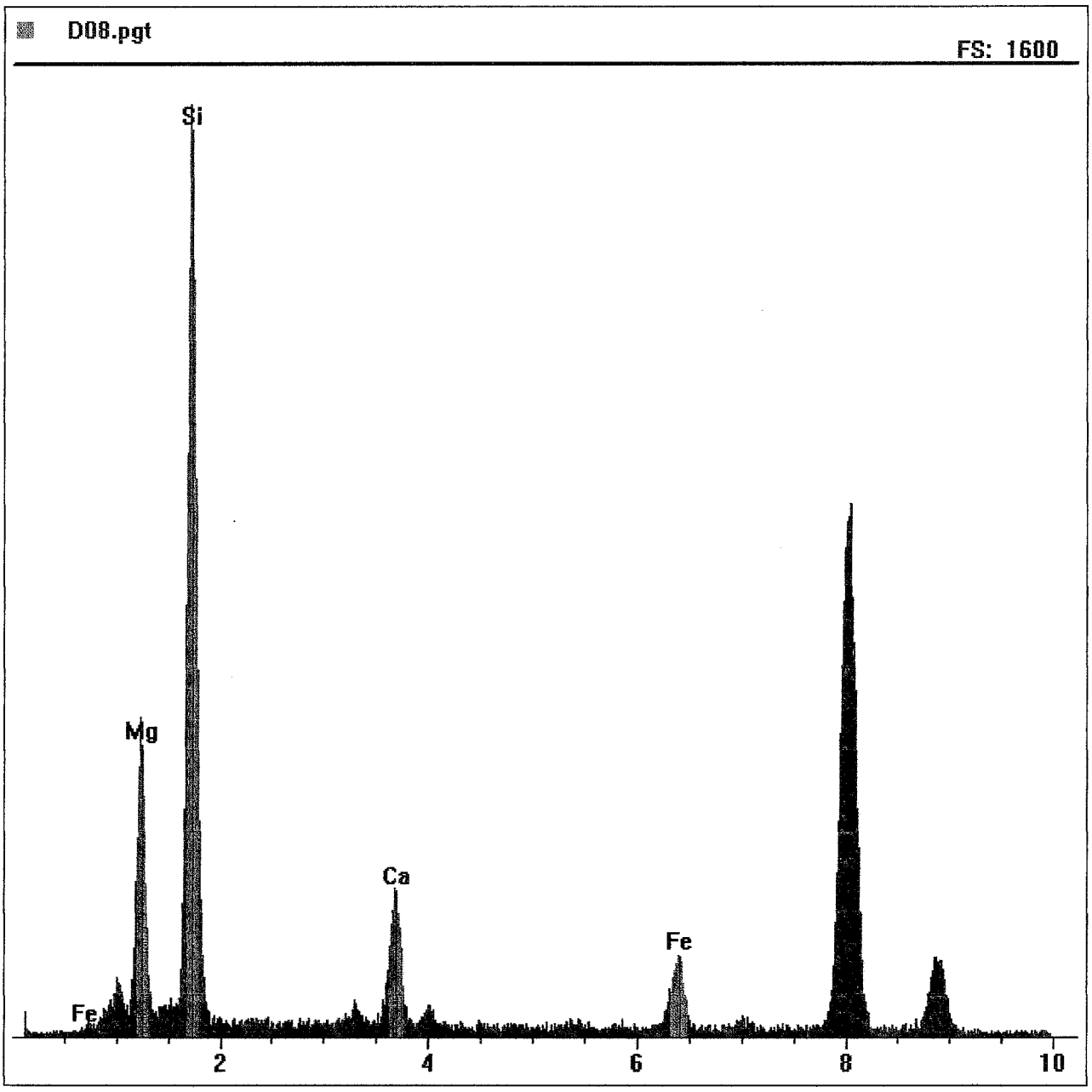
File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D08.pgt
Collected: September 24, 2013 09:48:02

Live Time:	173.64	Count Rate:	1409	Dead Time:	16.40 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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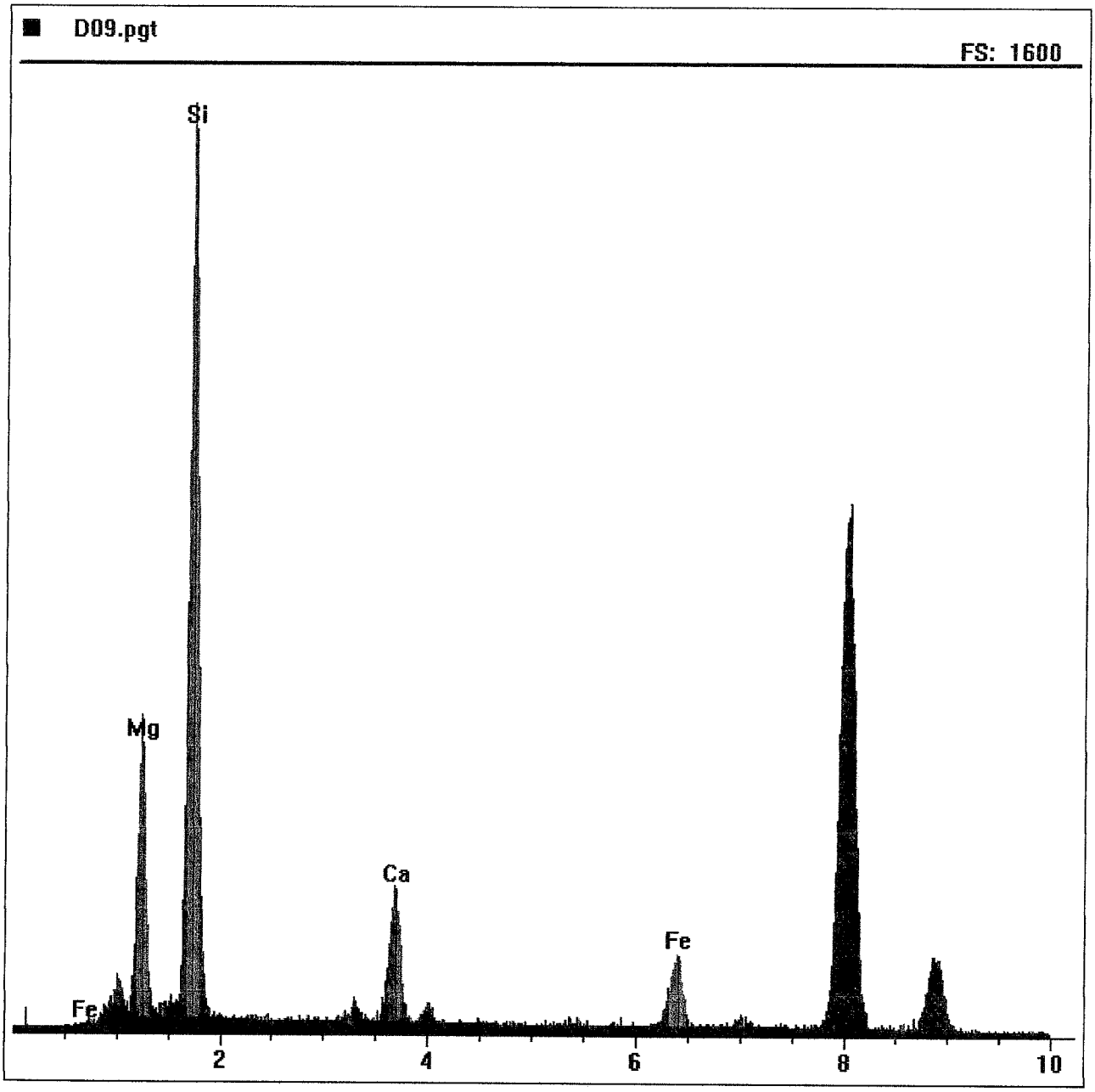
EMSL ANALYTICAL, INC.

File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D09.pgt
Collected: September 24, 2013 09:48:02

Live Time:	173.64	Count Rate:	1409	Dead Time:	16.40 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98

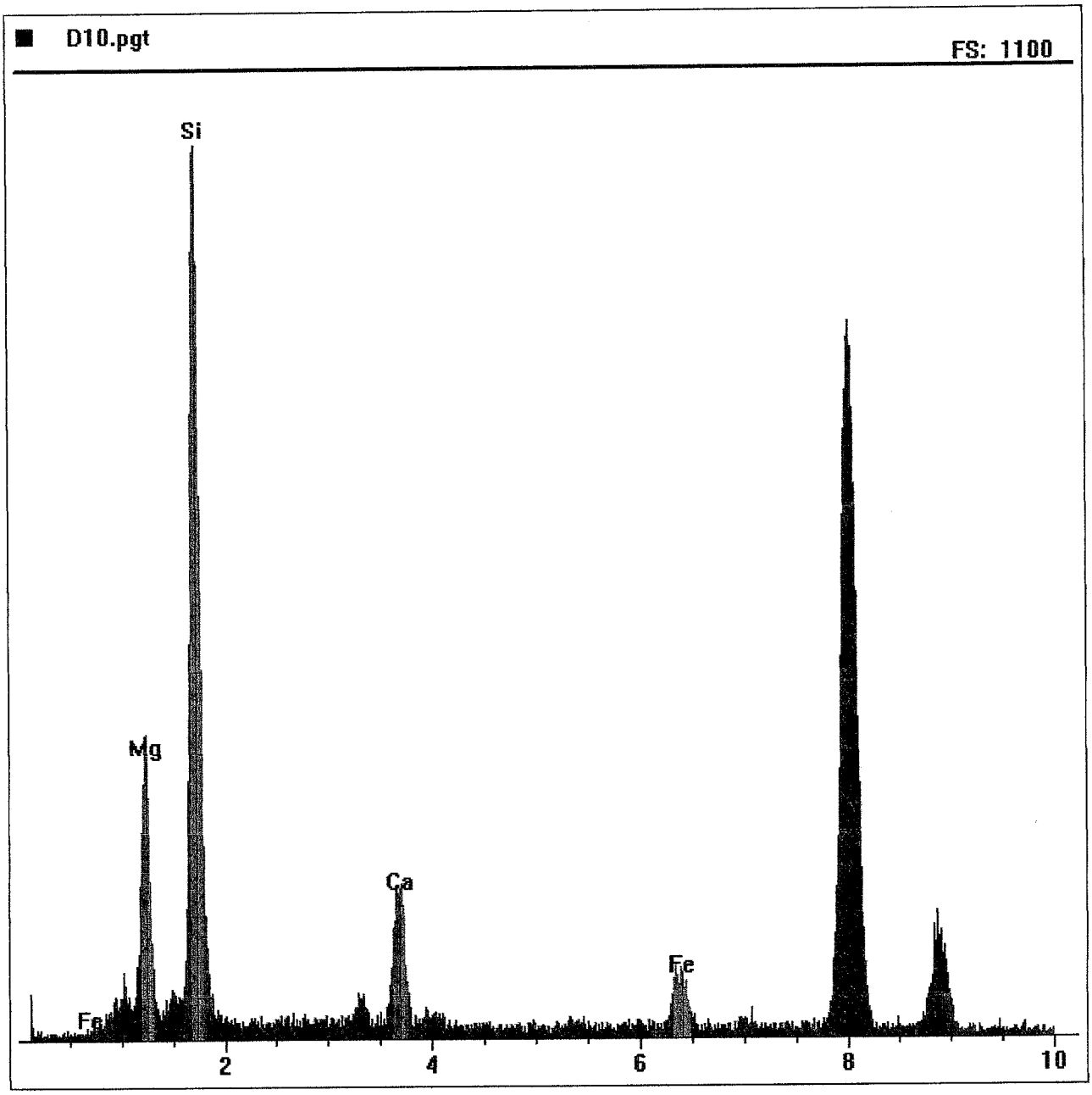


Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01231\D10.pgt
Collected: September 24, 2013 09:48:02

Live Time:	209.32	Count Rate:	931	Dead Time:	12.20 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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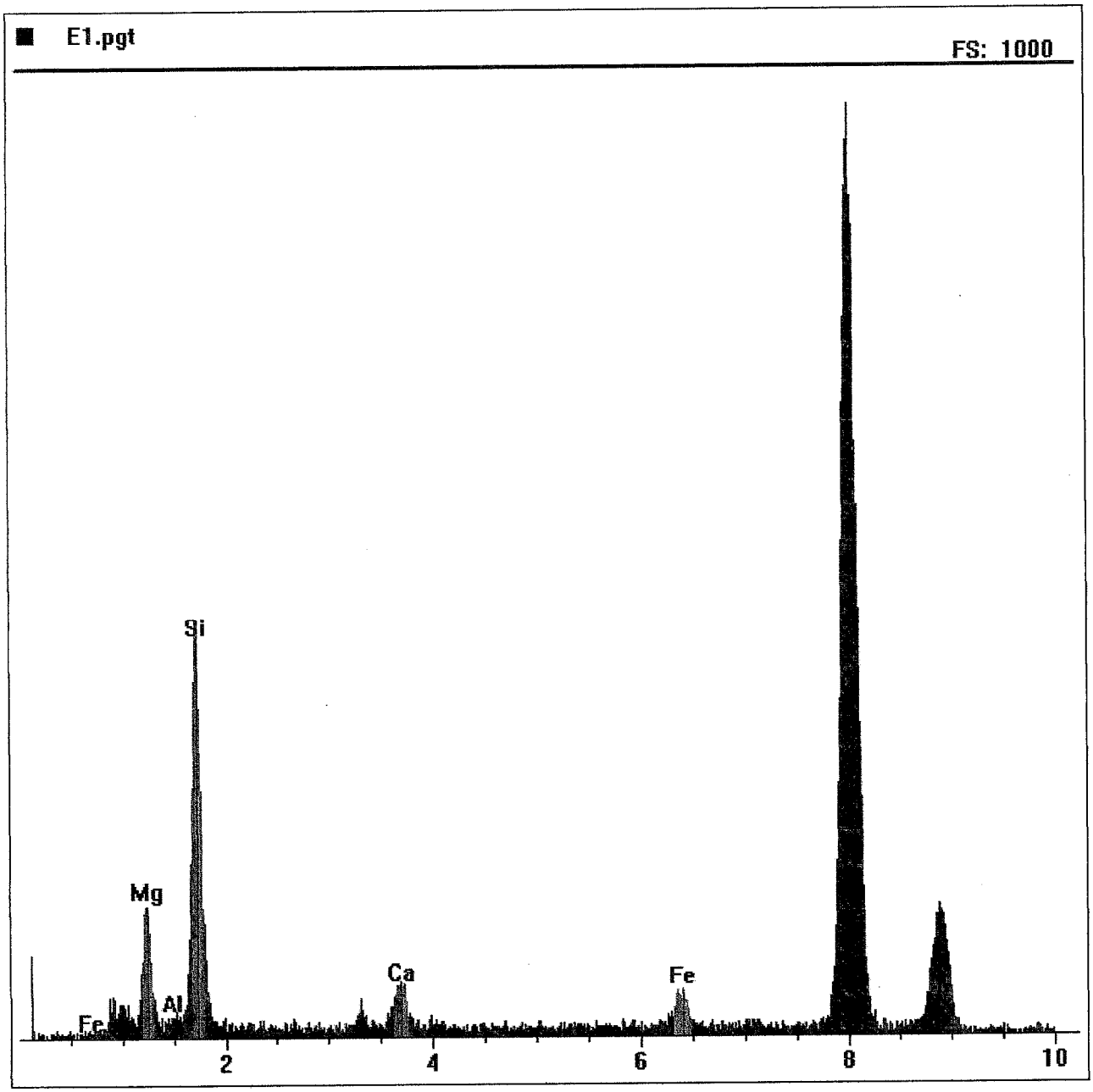
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E1.pgt
Collected: September 23, 2013 11:08:12

Live Time:	484.60	Count Rate:	284	Dead Time:	5.14 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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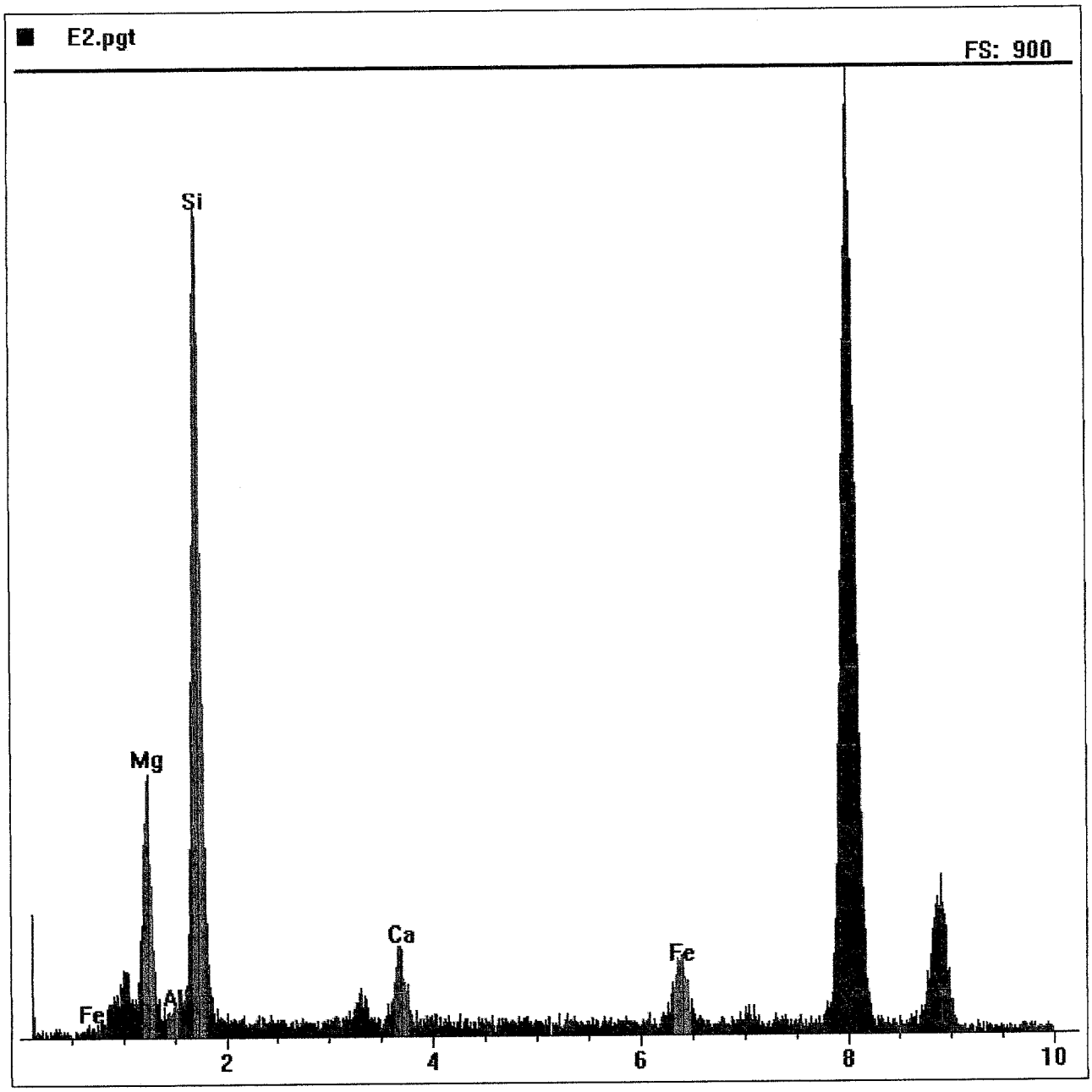
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E2.pgt
Collected: September 23, 2013 11:08:12

Live Time:	910.26	Count Rate:	177	Dead Time:	3.93 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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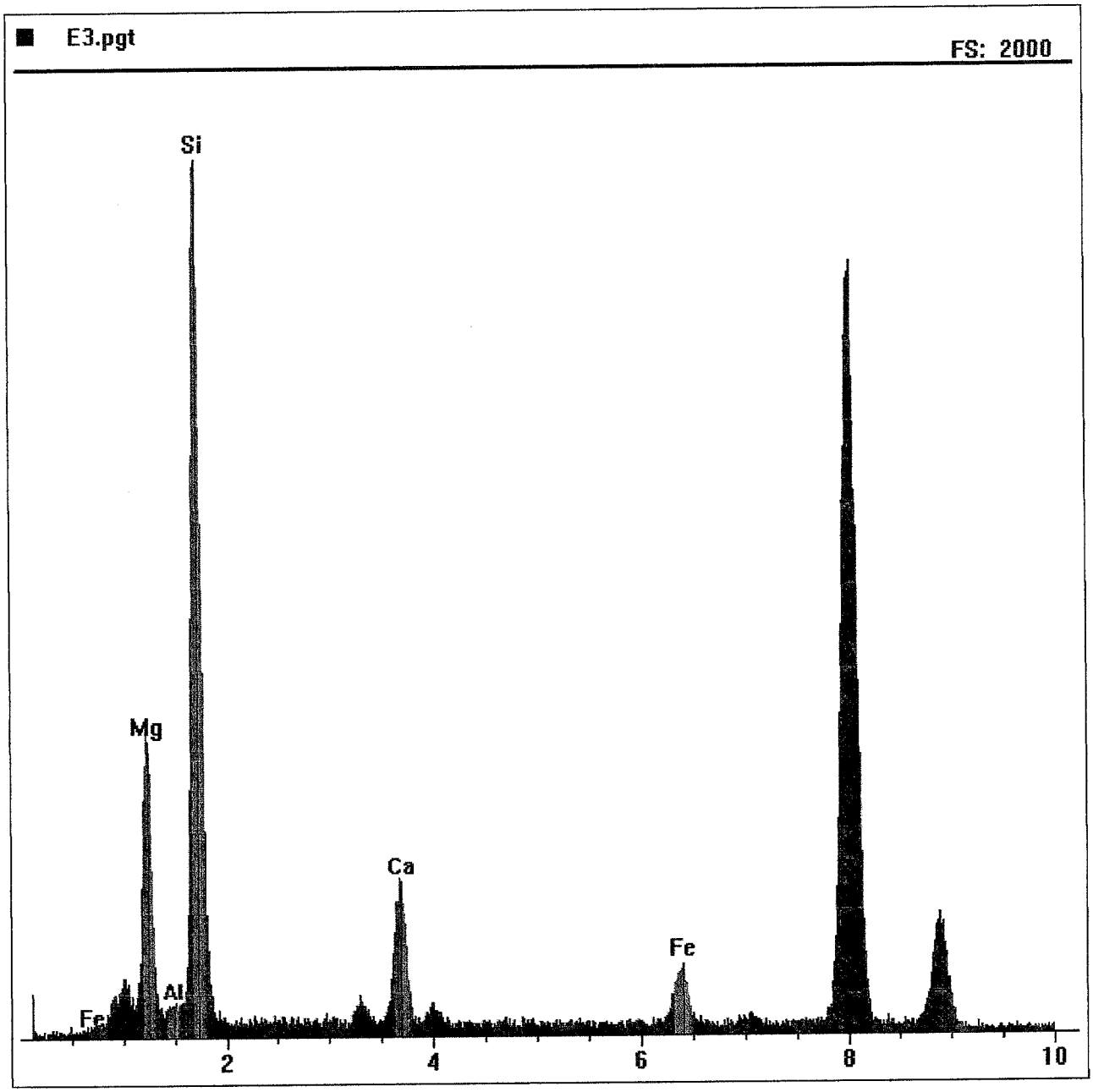
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E3.pgt
Collected: September 23, 2013 11:08:12

Live Time:	583.64	Count Rate:	607	Dead Time:	8.91 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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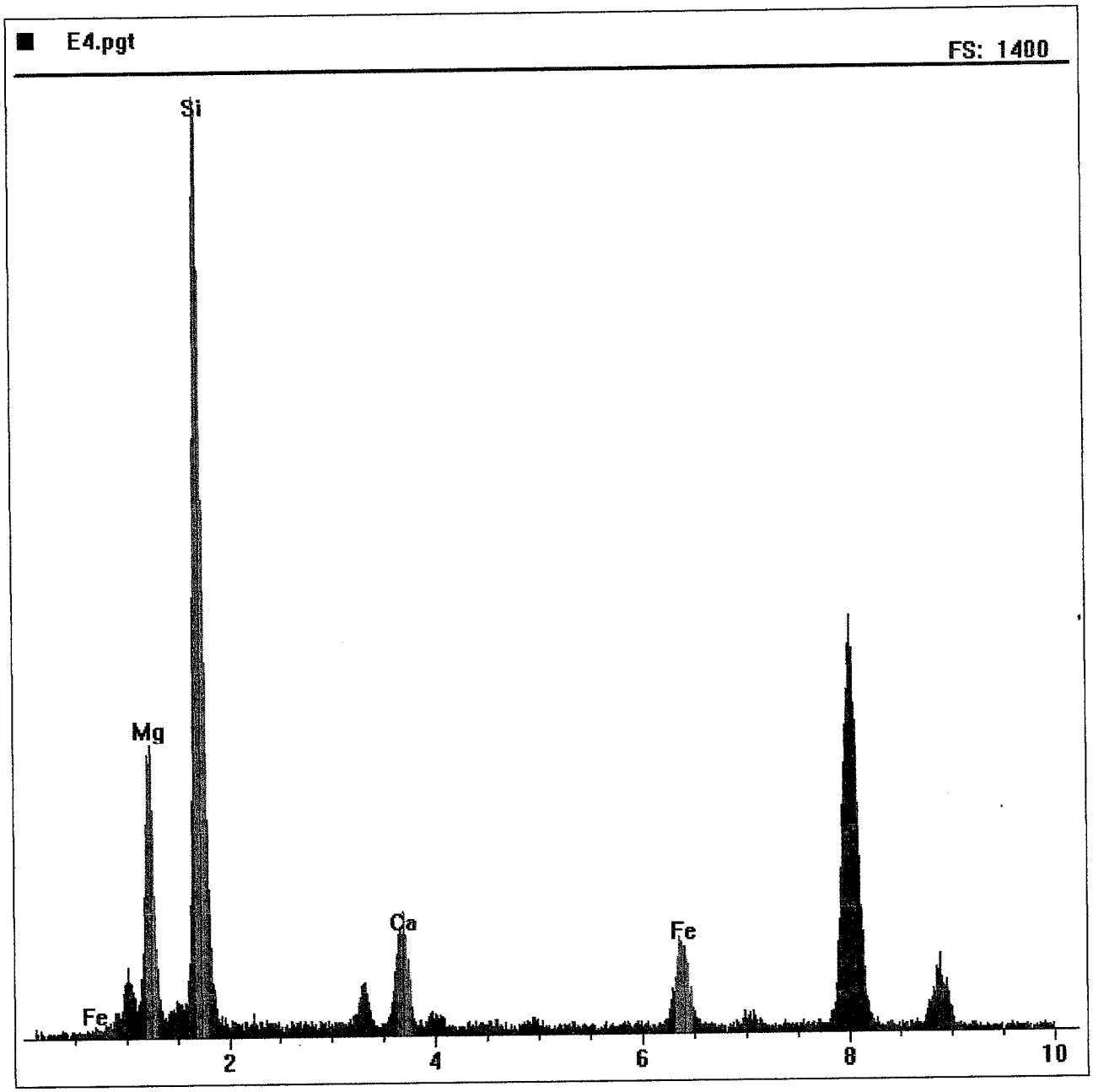
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E4.pgt
Collected: September 24, 2013 09:48:02

Live Time:	63.22	Count Rate:	3066	Dead Time:	30.24 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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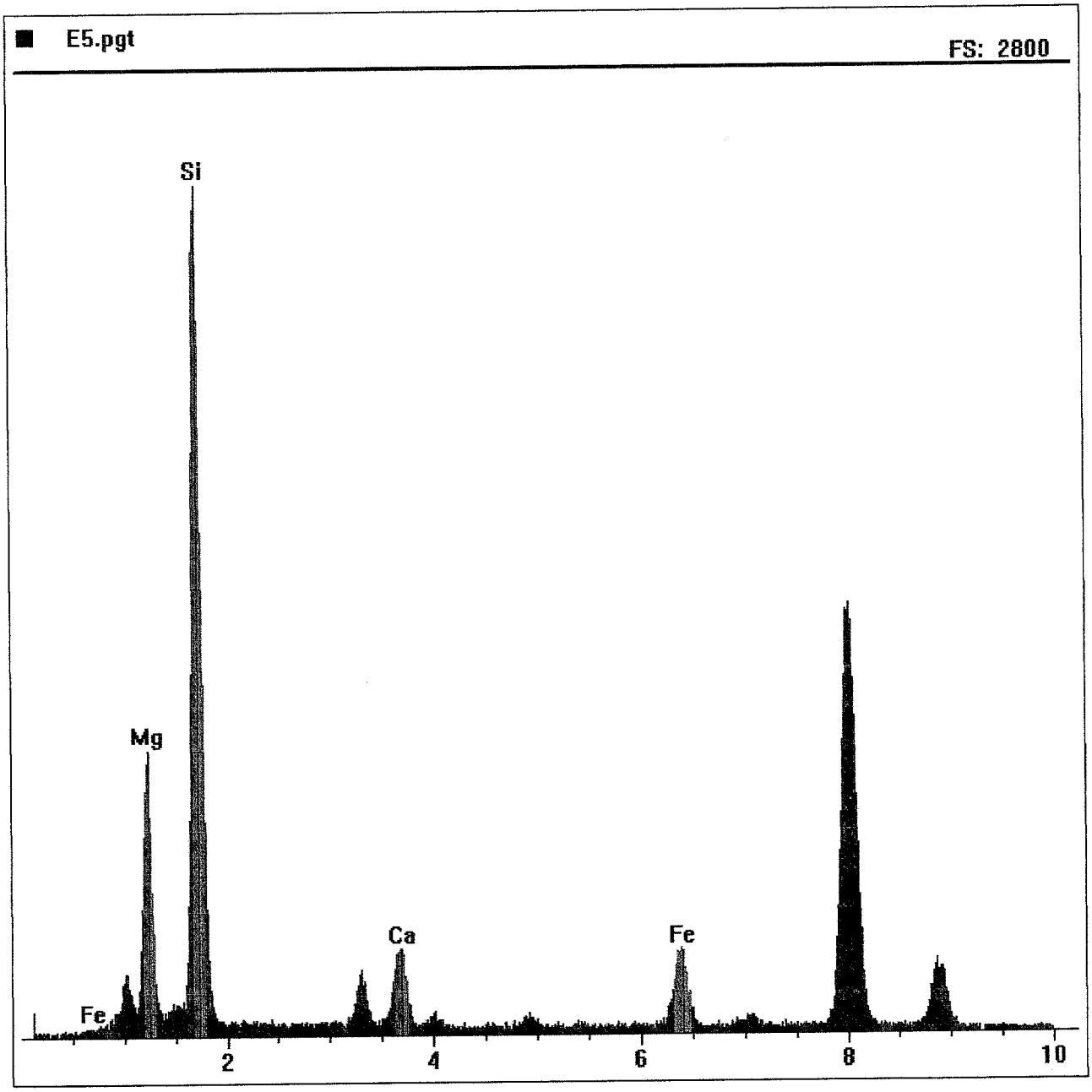
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E5.pgt
Collected: September 24, 2013 09:48:02

Live Time:	230.37	Count Rate:	1644	Dead Time:	19.08 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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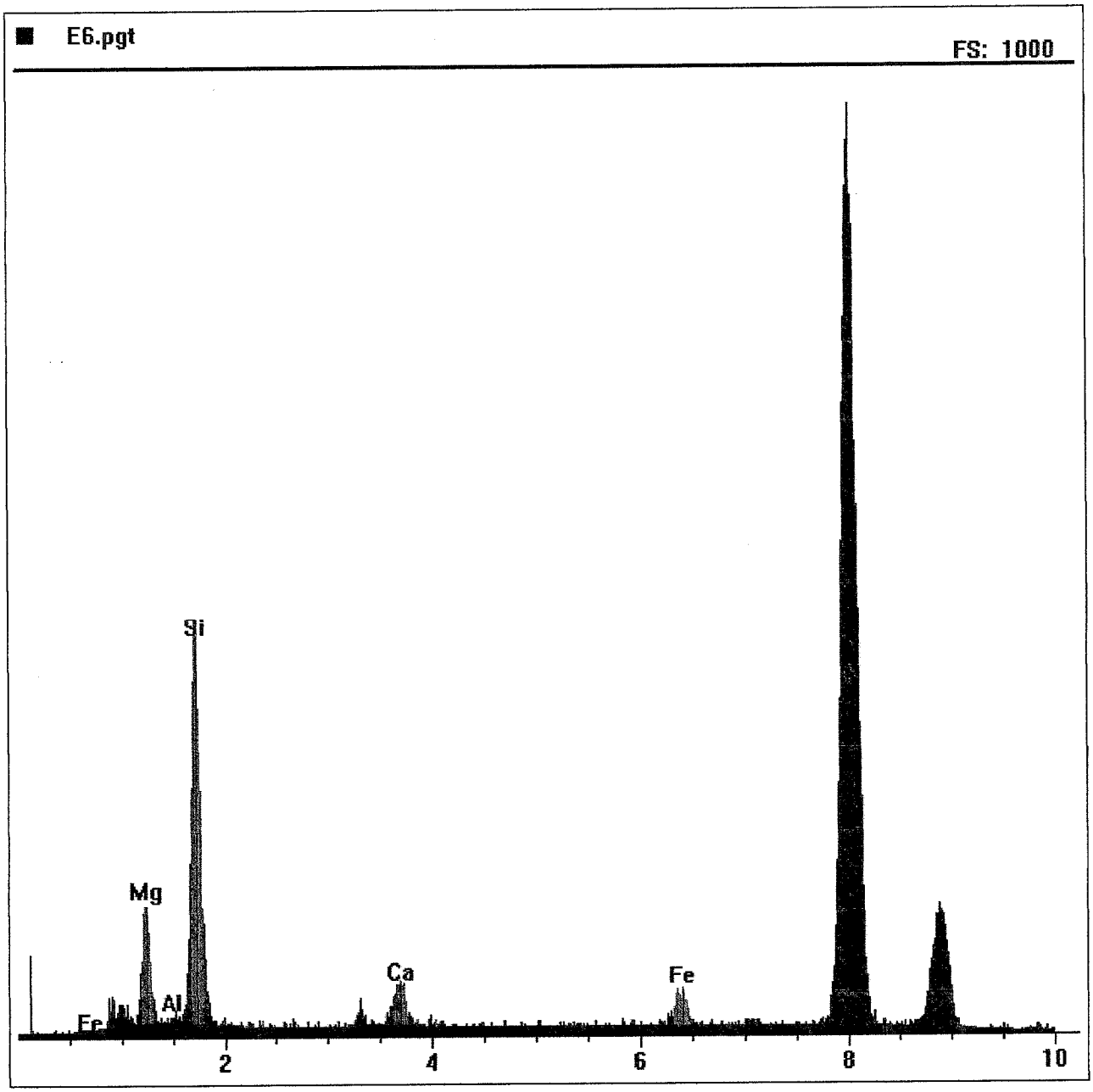
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E6.pgt
Collected: September 23, 2013 11:08:12

Live Time:	484.60	Count Rate:	284	Dead Time:	5.14 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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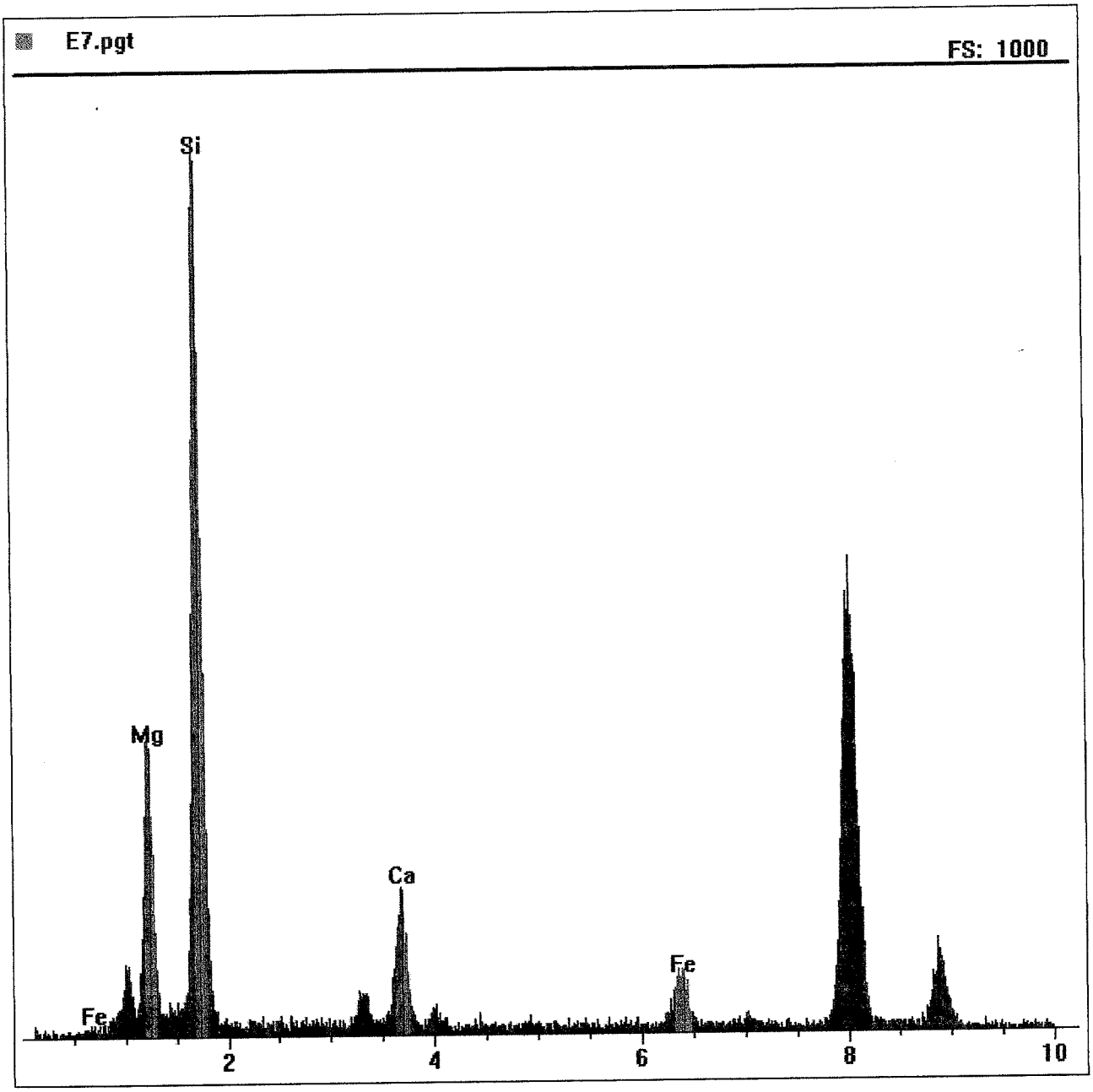
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E7.pgt
Collected: September 24, 2013 09:48:02

Live Time:	59.20	Count Rate:	2353	Dead Time:	24.49 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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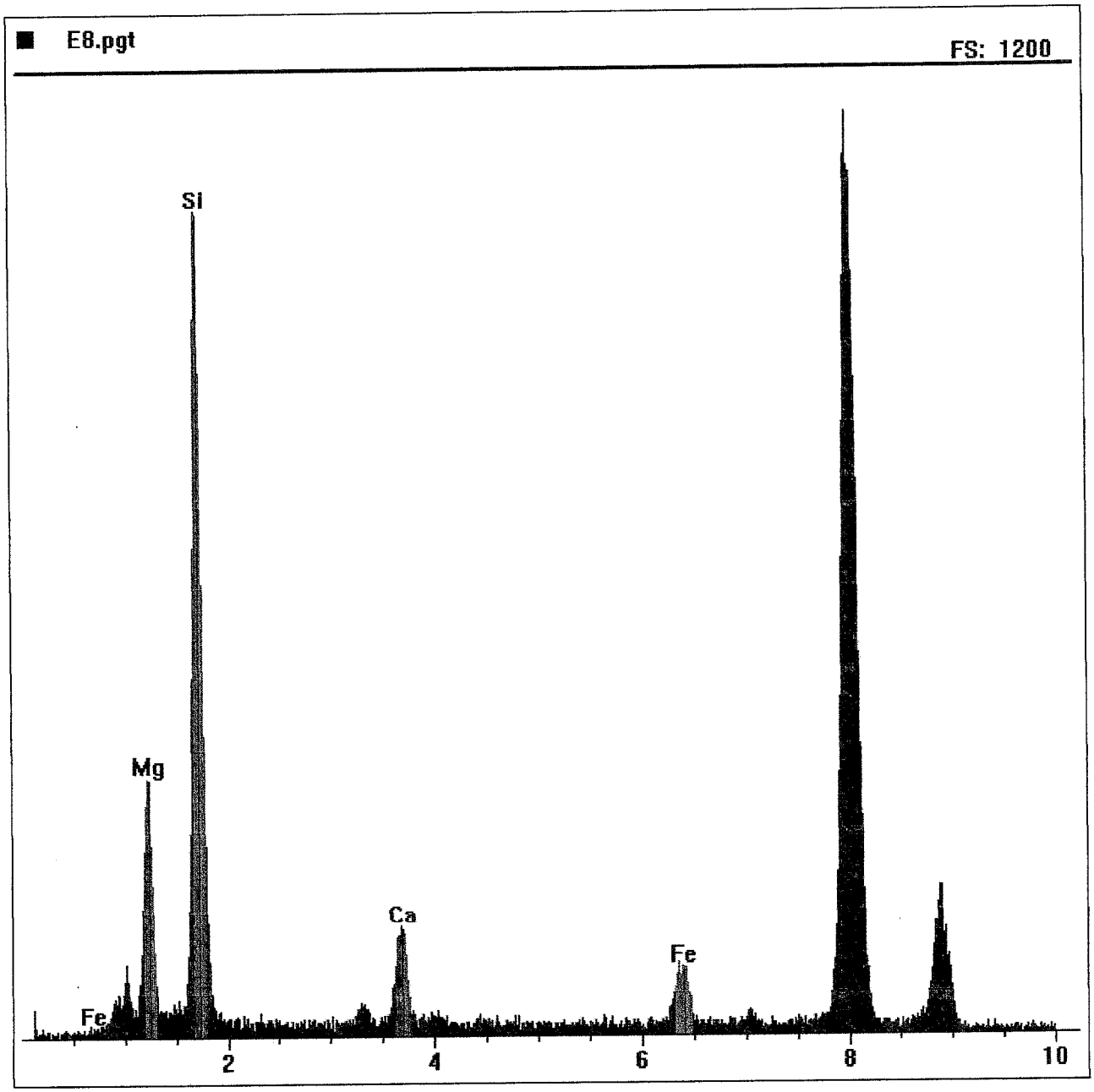
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E8.pgt
Collected: September 24, 2013 10:53:11

Live Time:	170.70	Count Rate:	1239	Dead Time:	15.00 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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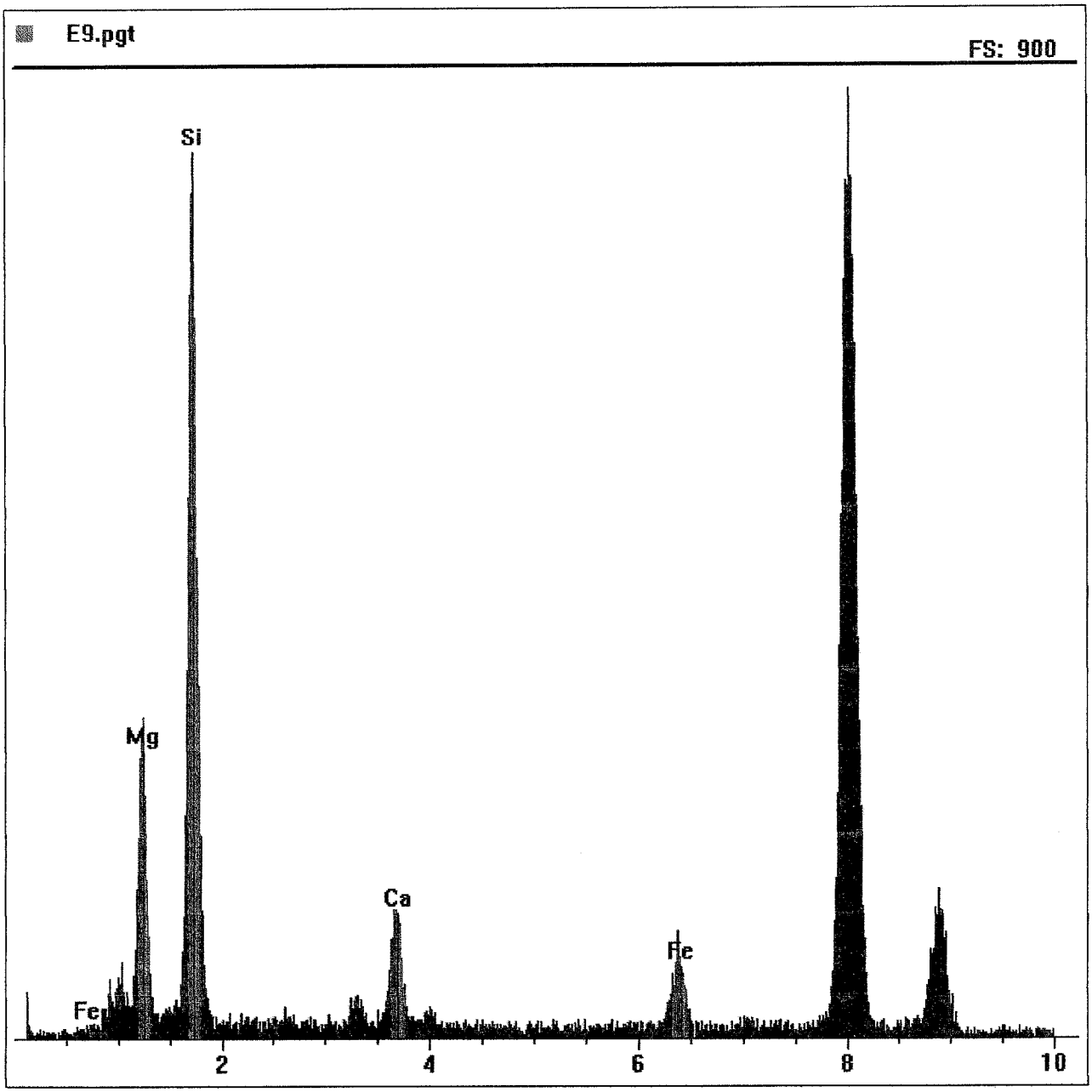
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E9.pgt
Collected: September 24, 2013 10:53:11

Live Time:	228.41	Count Rate:	742	Dead Time:	11.62 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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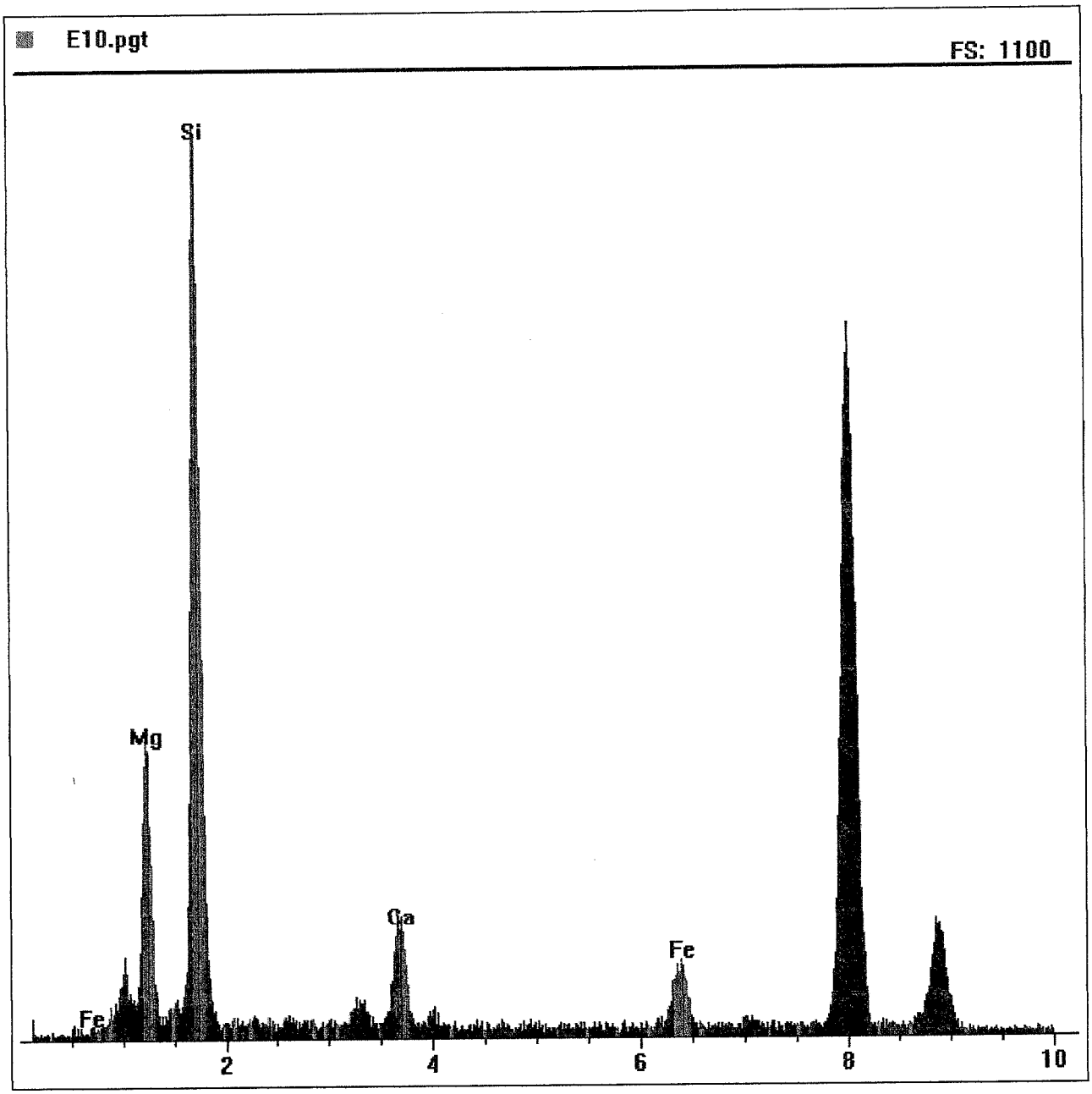
File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW21281\E10.pgt
Collected: September 24, 2013 10:53:11

Live Time:	122.24	Count Rate:	1532	Dead Time:	17.59 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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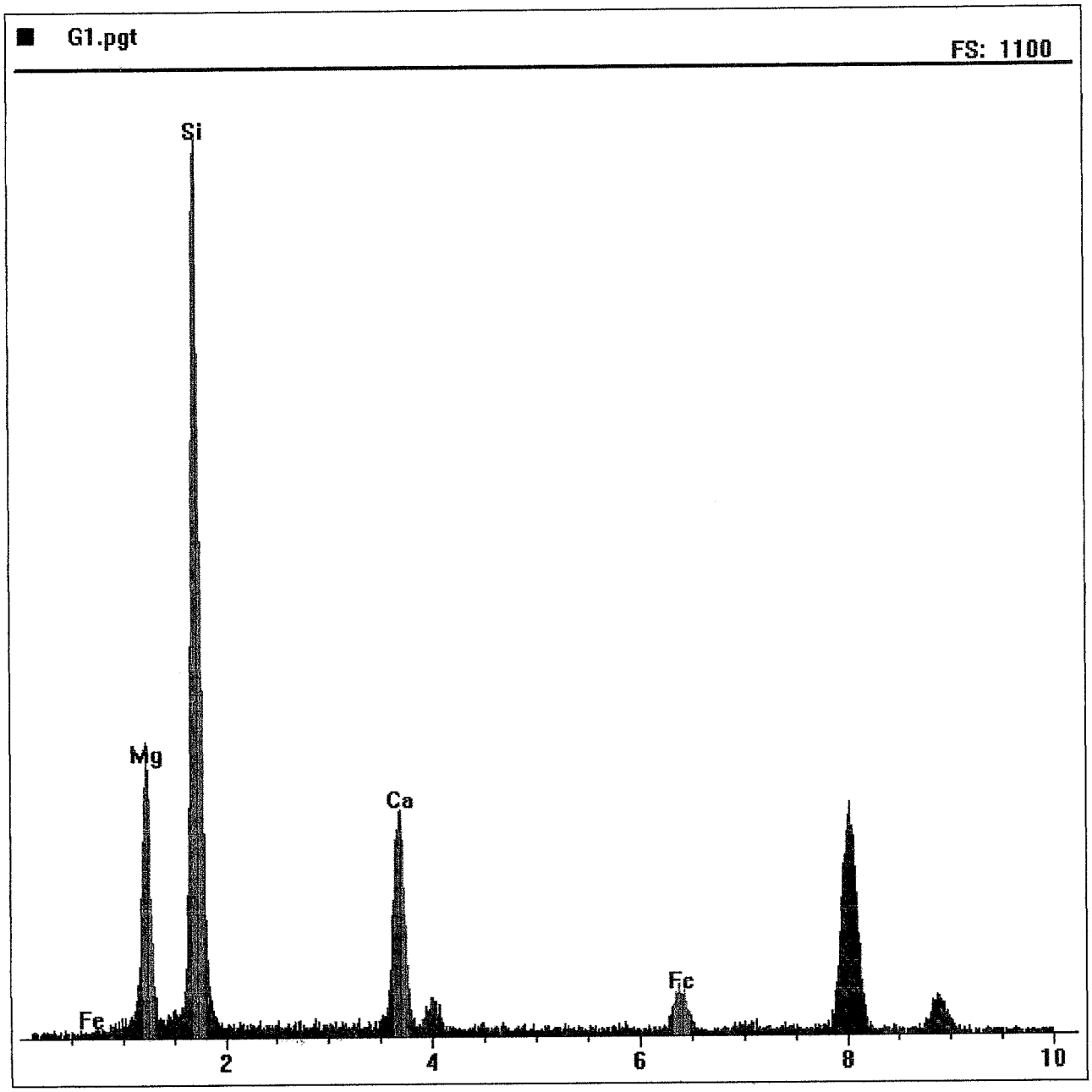
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G1.pgt
Collected: September 24, 2013 11:11:27

Live Time:	21.99	Count Rate:	5806	Dead Time:	48.53 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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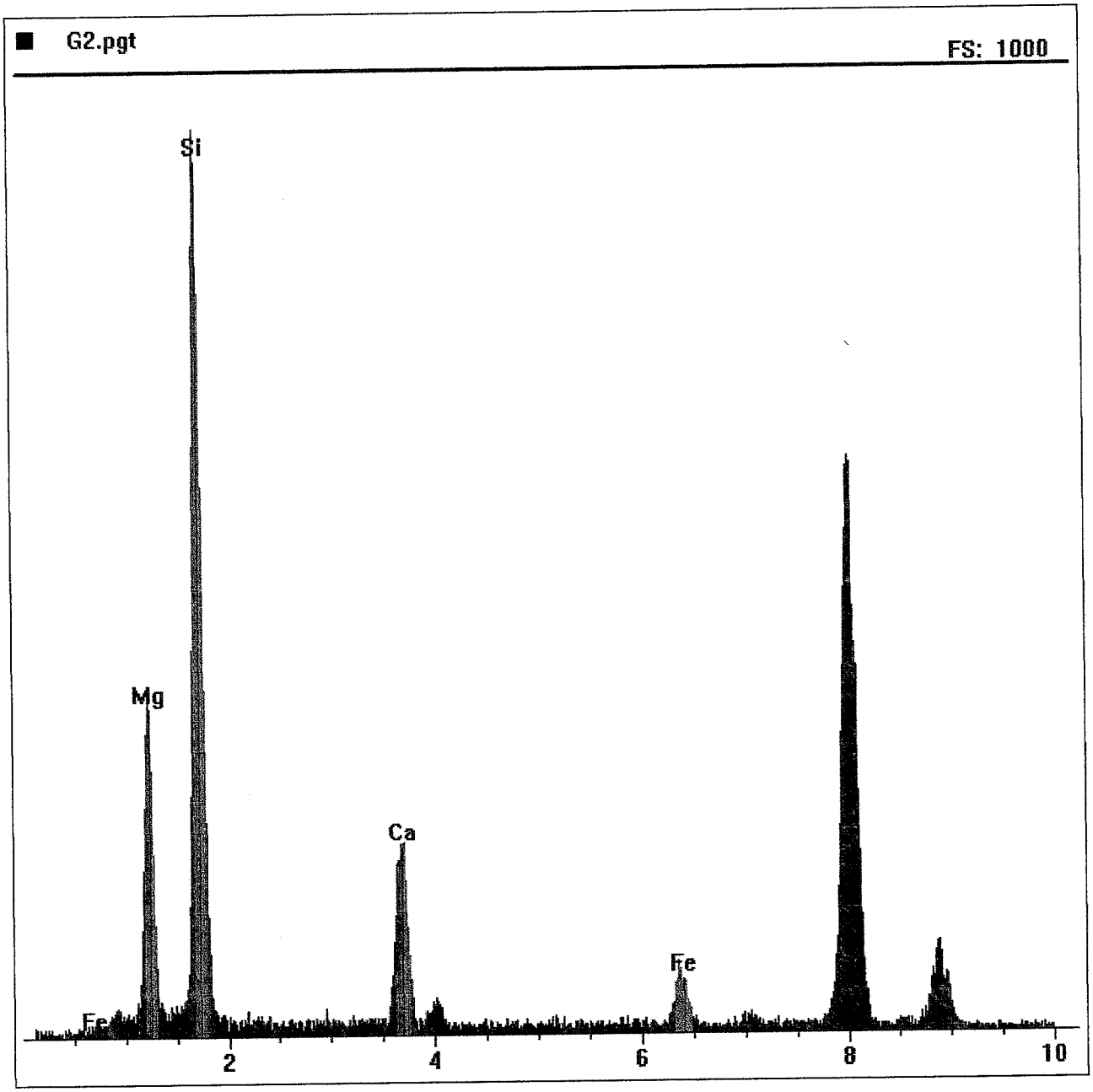
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G2.pgt
Collected: September 24, 2013 11:11:27

Live Time:	104.25	Count Rate:	1461	Dead Time:	16.74 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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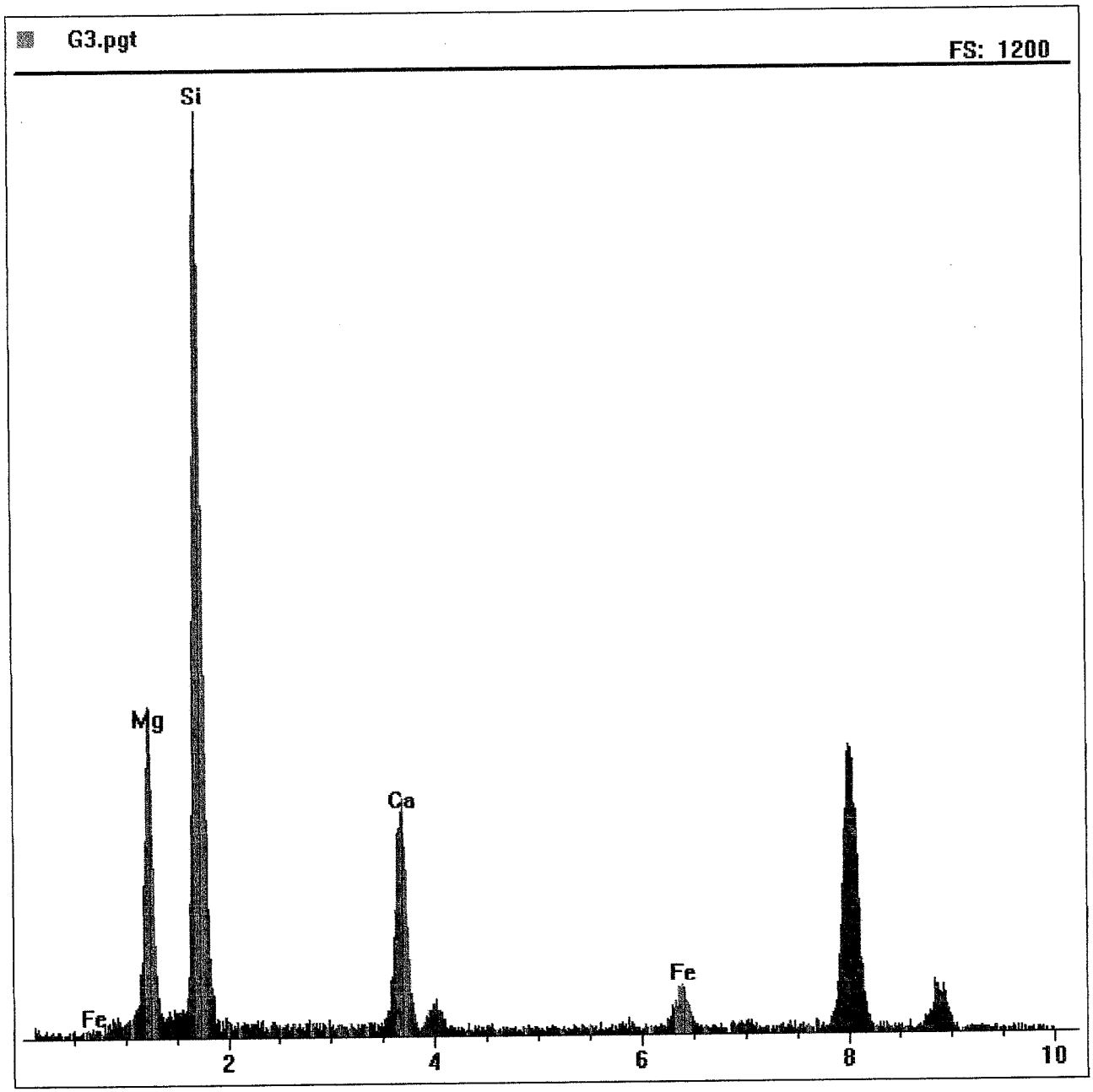
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G3.pgt
Collected: September 24, 2013 11:11:27

Live Time:	45.92	Count Rate:	3193	Dead Time:	30.84 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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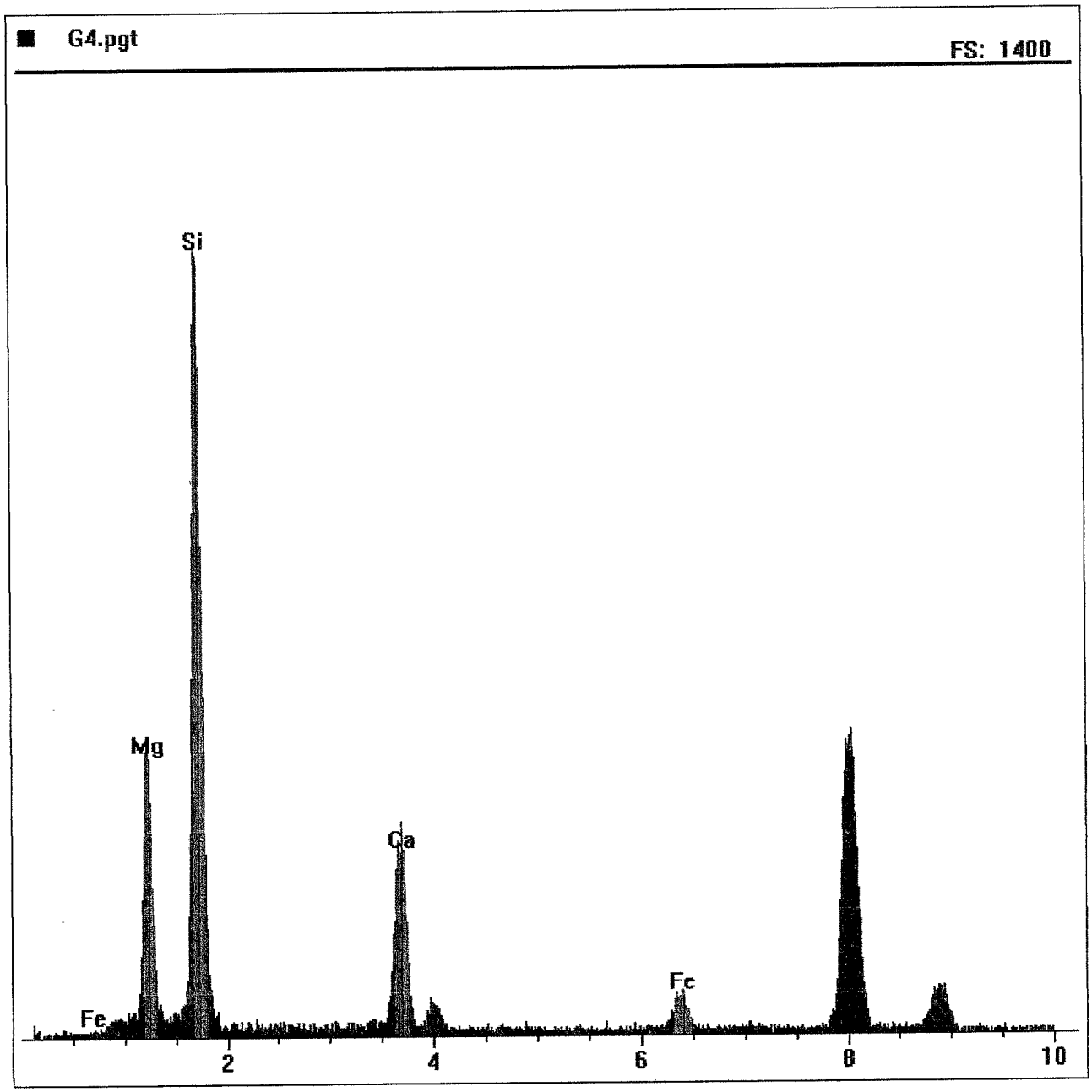
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G4.pgt
Collected: September 24, 2013 11:17:49

Live Time:	65.85	Count Rate:	2492	Dead Time:	25.48 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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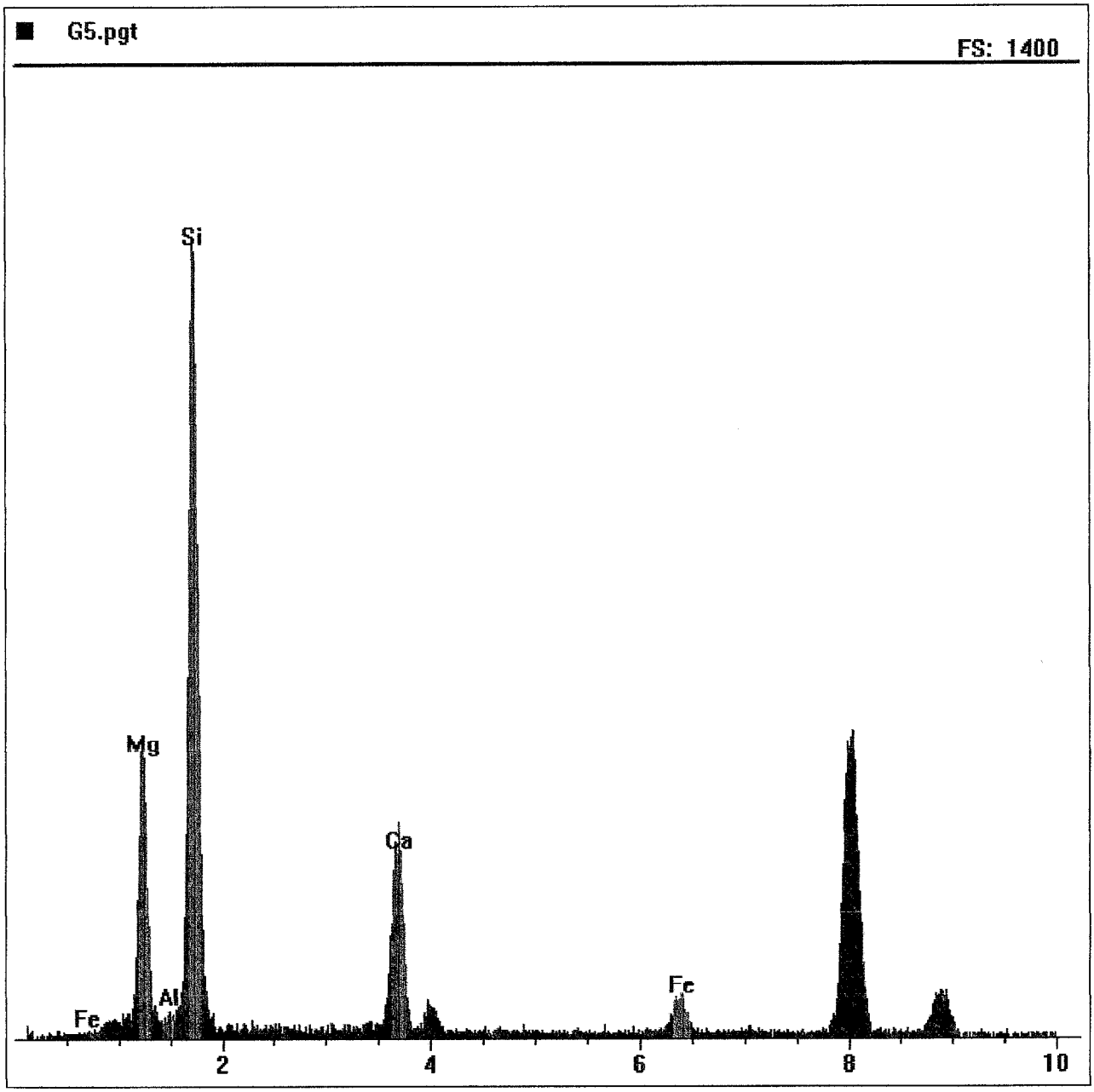
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G5.pgt
Collected: September 24, 2013 11:17:49

Live Time:	65.85	Count Rate:	2492	Dead Time:	25.48 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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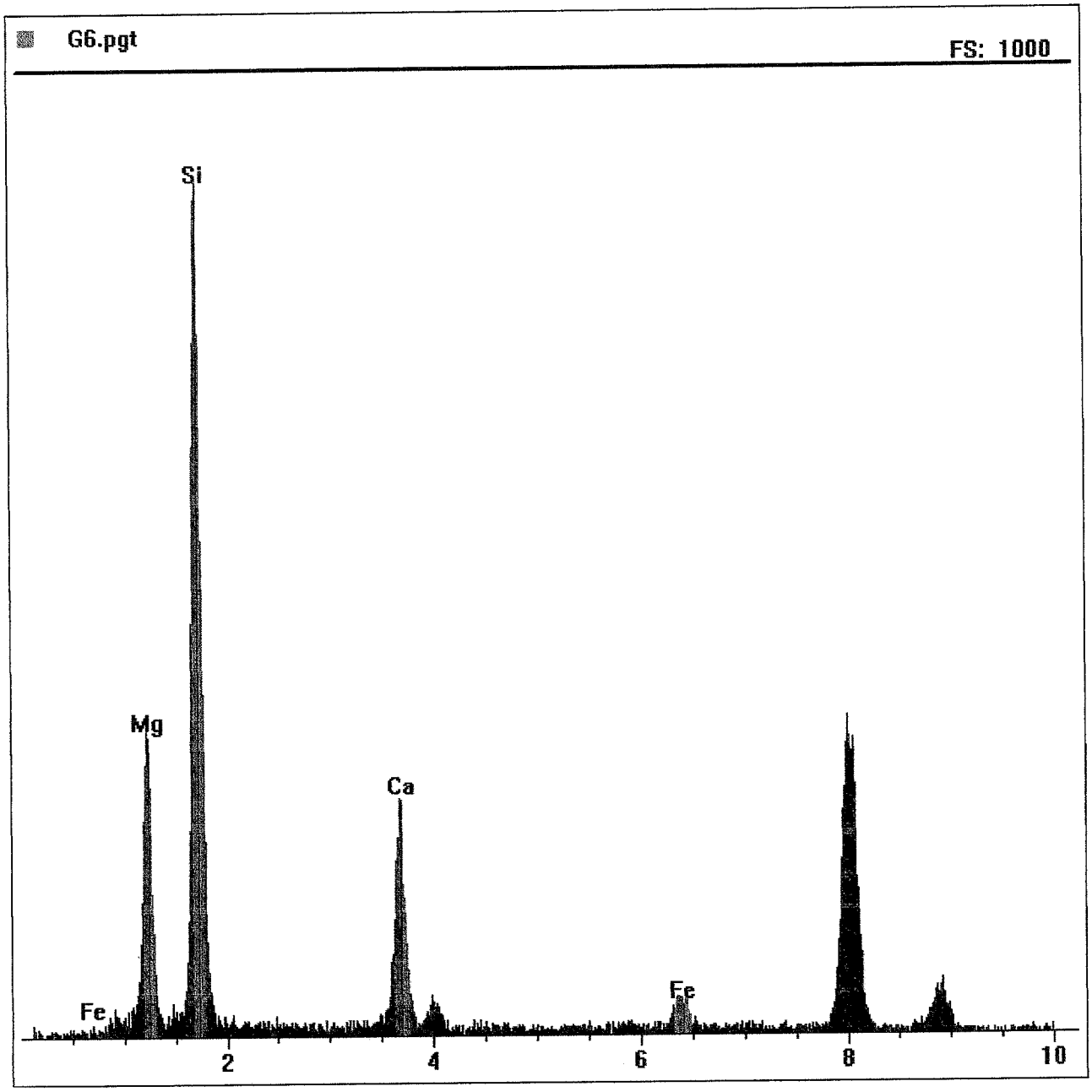
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G6.pgt
Collected: September 24, 2013 11:17:49

Live Time:	43.25	Count Rate:	2735	Dead Time:	27.38 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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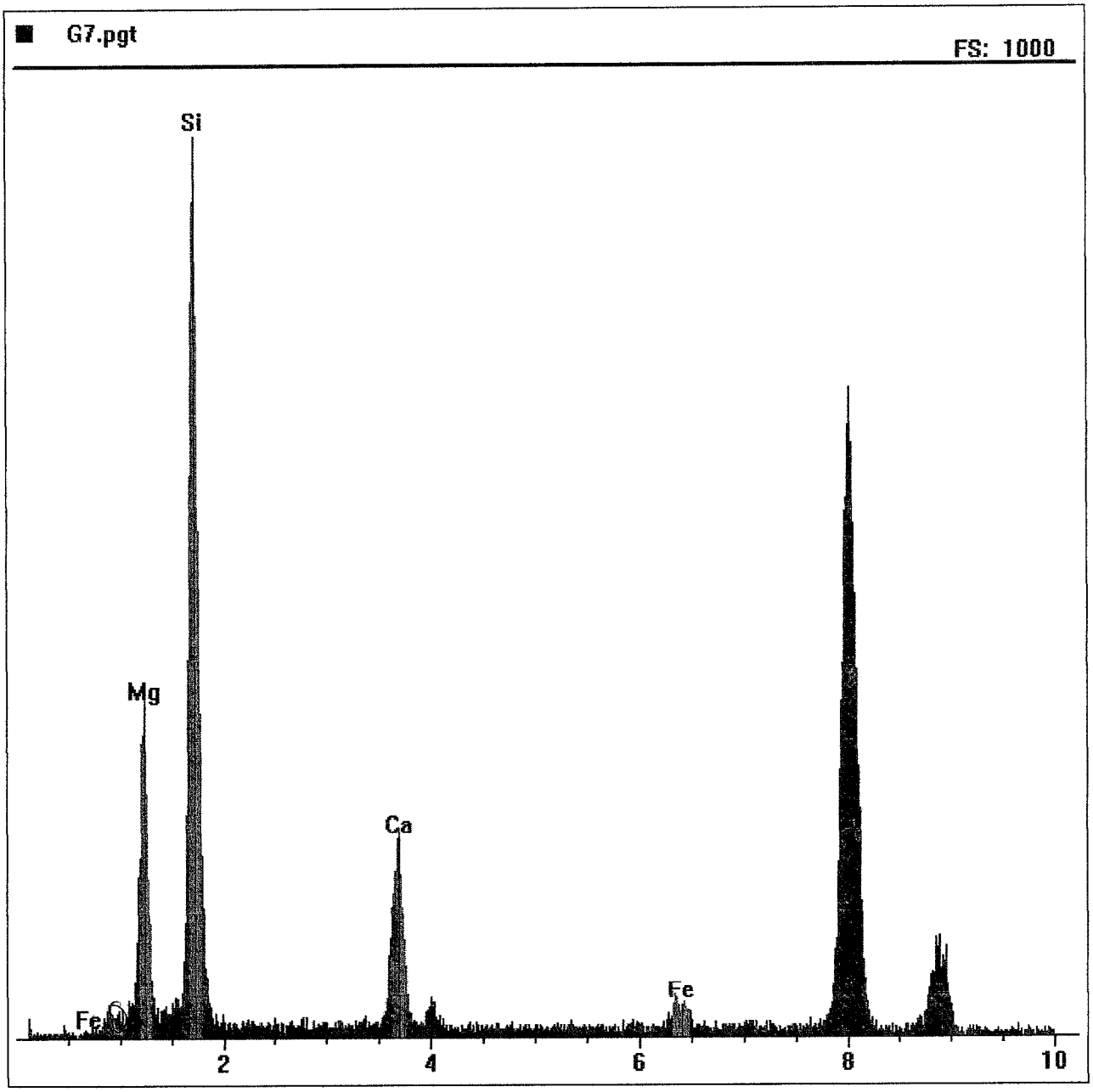
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G7.pgt
Collected: September 24, 2013 11:21:56

Live Time:	104.15	Count Rate:	1460	Dead Time:	16.76 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98

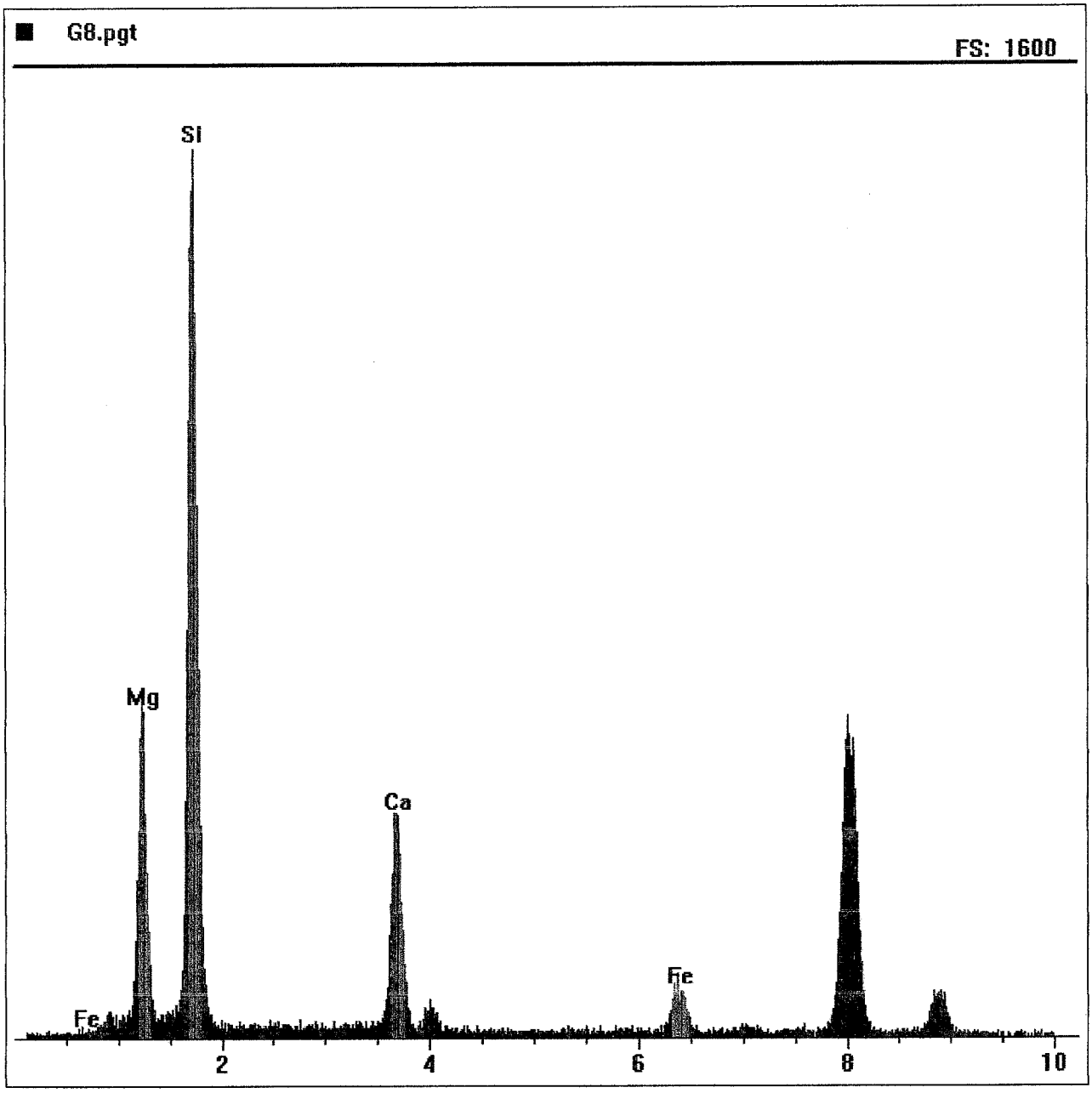


Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G8.pgt
Collected: September 24, 2013 11:21:56

Live Time:	48.97	Count Rate:	4057	Dead Time:	37.03 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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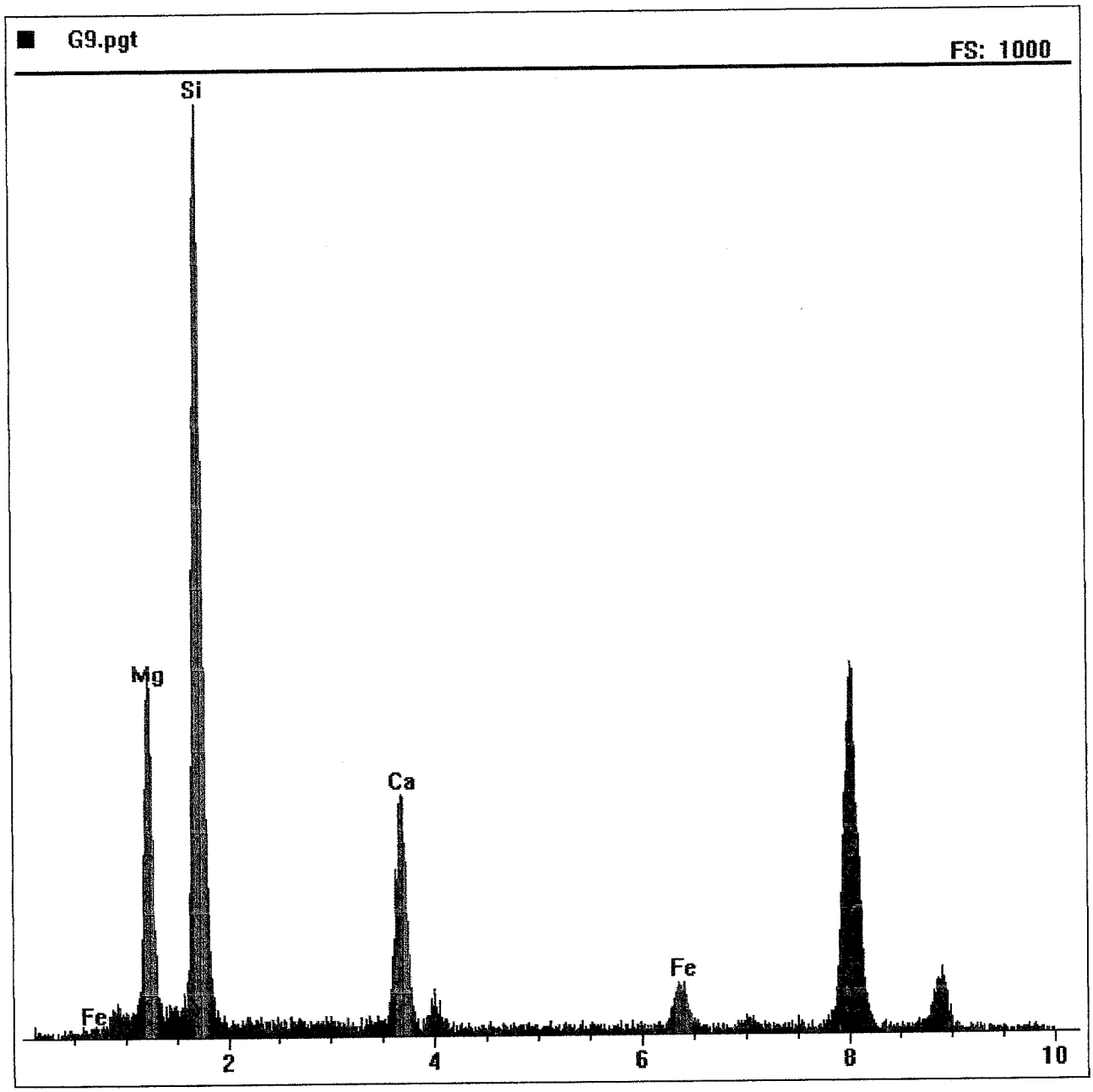
File: F:\Documen...ecords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G9.pgt
Collected: September 24, 2013 11:21:56

Live Time:	34.59	Count Rate:	3998	Dead Time:	36.75 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



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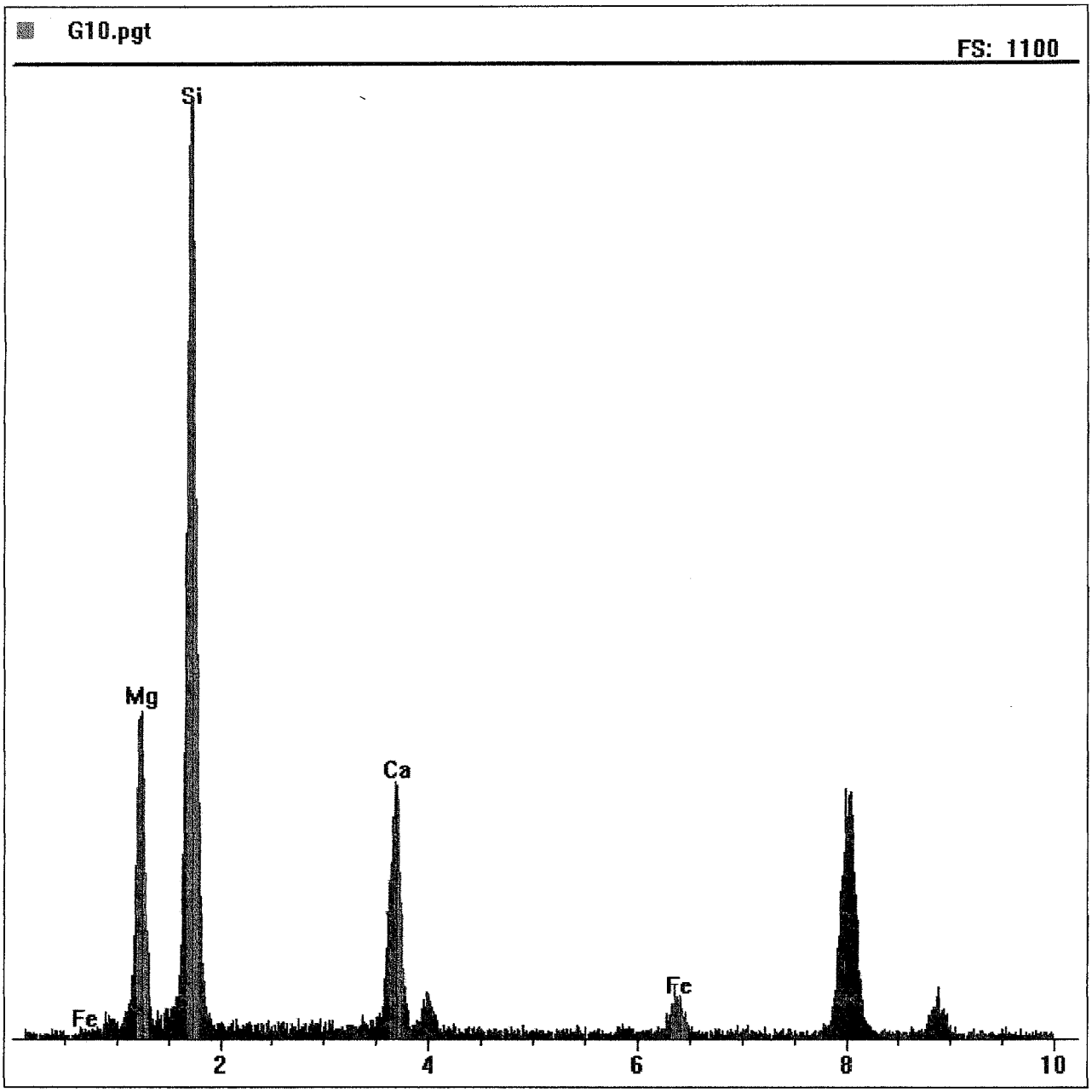
File: F:\Documen...cords\PGT Files\EMSL27-2\EMSL27-2 2013\SW01TR1\G10.pgt
Collected: September 24, 2013 11:21:56

Live Time:	12.47	Count Rate:	11299	Dead Time:	72.57 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98

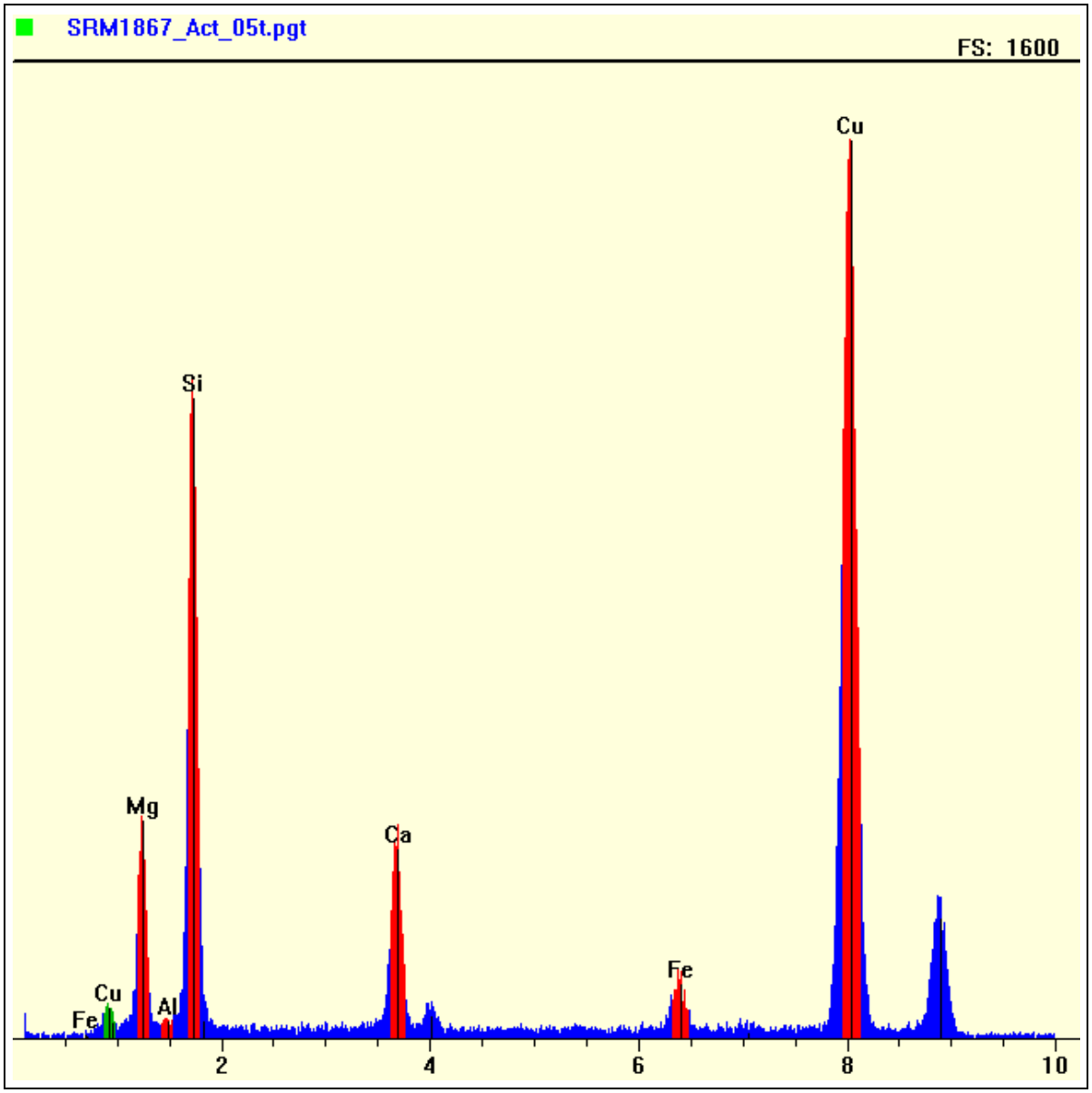


Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...2\EMSL27-2 2013\SRM1867 Actinolite\SRM1867_Act_05t.pgt
Collected: September 27, 2013 08:33:01

Live Time:	208.79	Count Rate:	1240	Dead Time:	14.68 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



EDXA of NIST Actinolite Image 29019

EMSL Analytical Inc. 107 West 4th Street, Libby, MT, 59923
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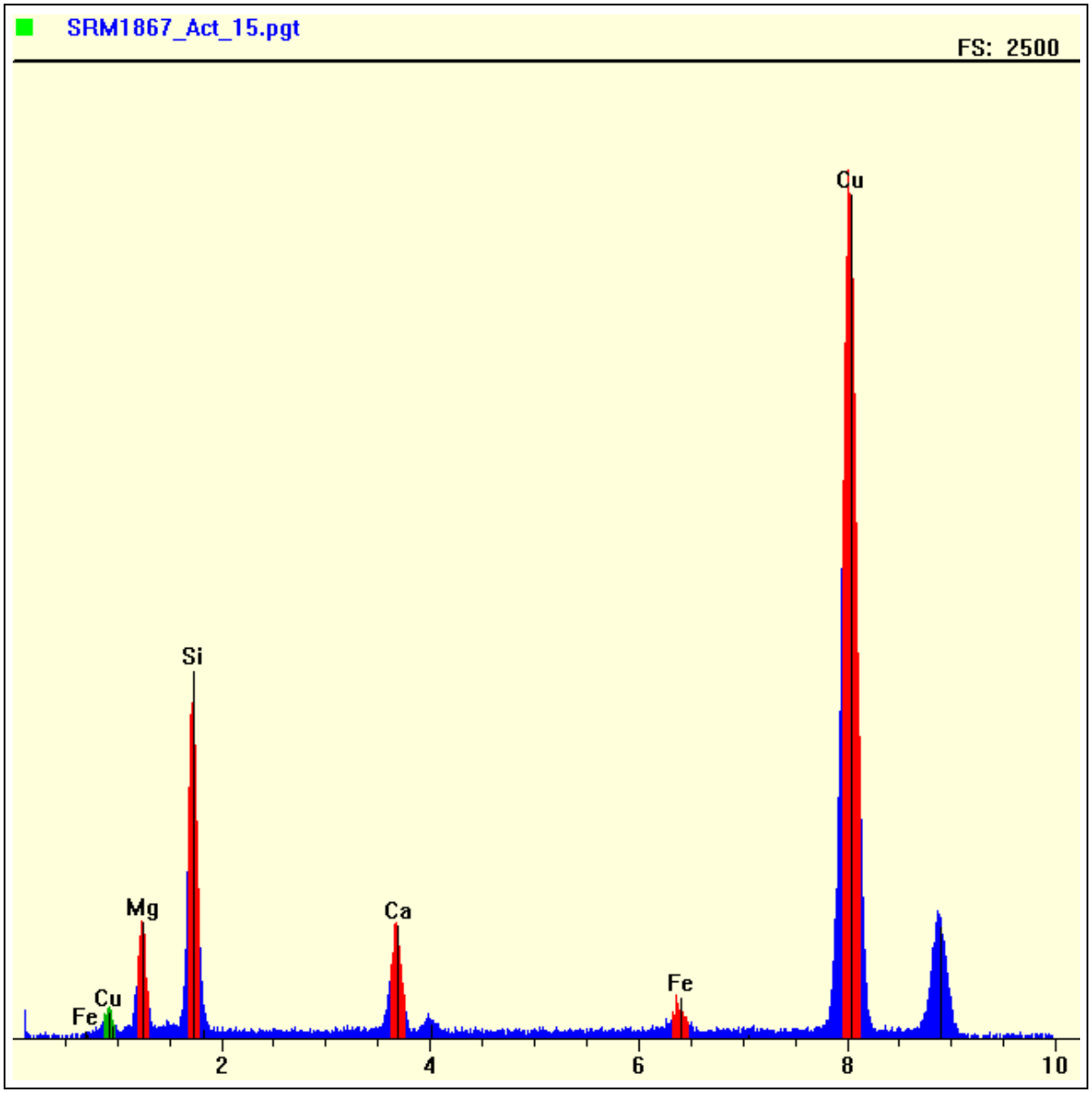
Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...-2\EMSL27-2 2013\SRM1867 Actinolite\SRM1867_Act_15.pgt
Collected: September 27, 2013 08:33:01

Live Time:	408.63	Count Rate:	777	Dead Time:	10.72 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



EDXA of NIST Actinolite Image 29031

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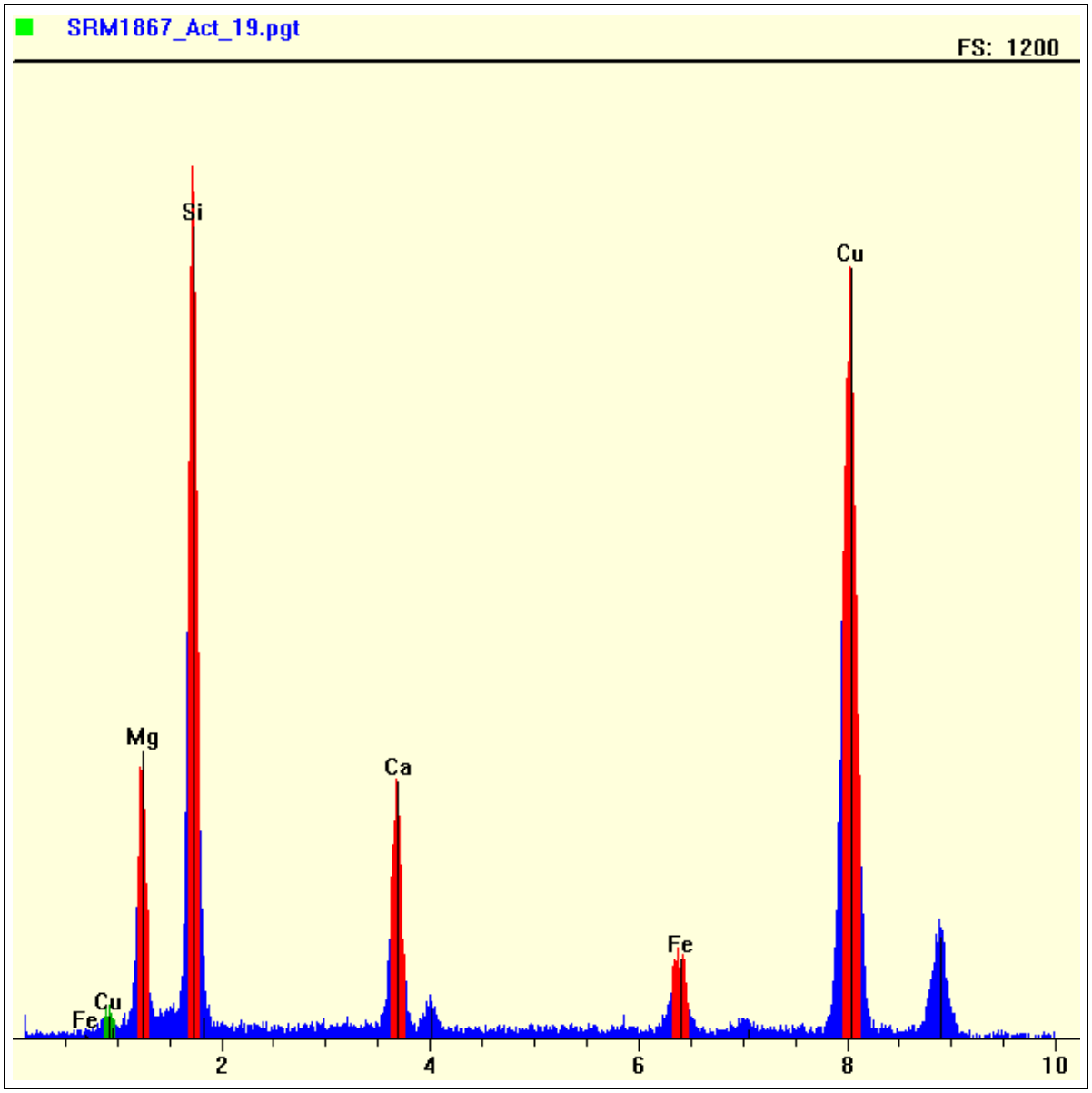
File: F:\Documen...-2\EMSL27-2 2013\SRM1867 Actinolite\SRM1867_Act_19.pgt
Collected: September 27, 2013 08:33:01

Live Time:	104.32	Count Rate:	1895	Dead Time:	20.46 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



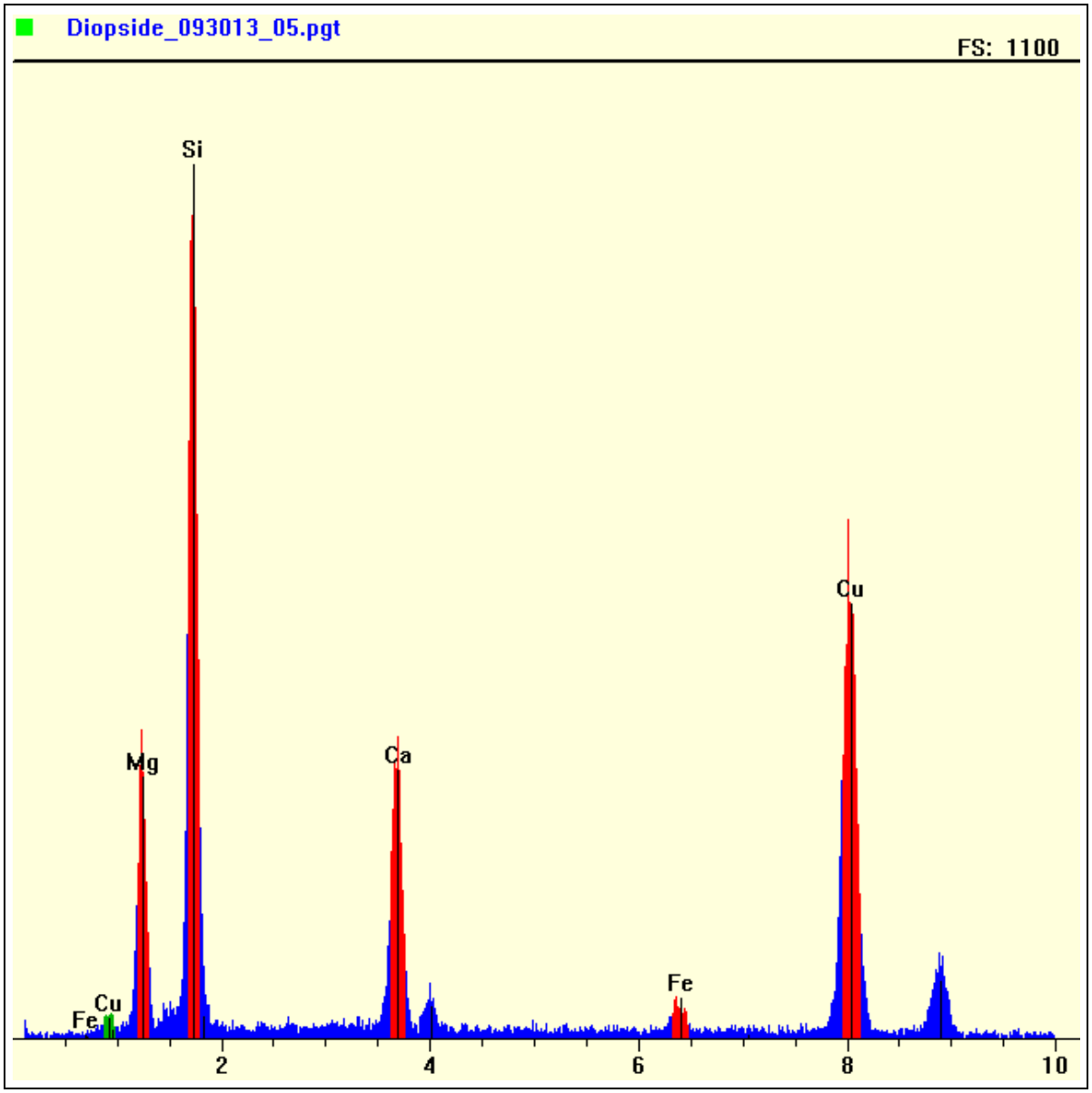
EDXA of NIST Actinolite Image 29035

Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...L27-2\EMSL27-2 2013\Diopside_01\Diopside_093013_05.pgt
Collected: September 30, 2013 10:16:44

Live Time:	108.71	Count Rate:	1426	Dead Time:	16.43 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



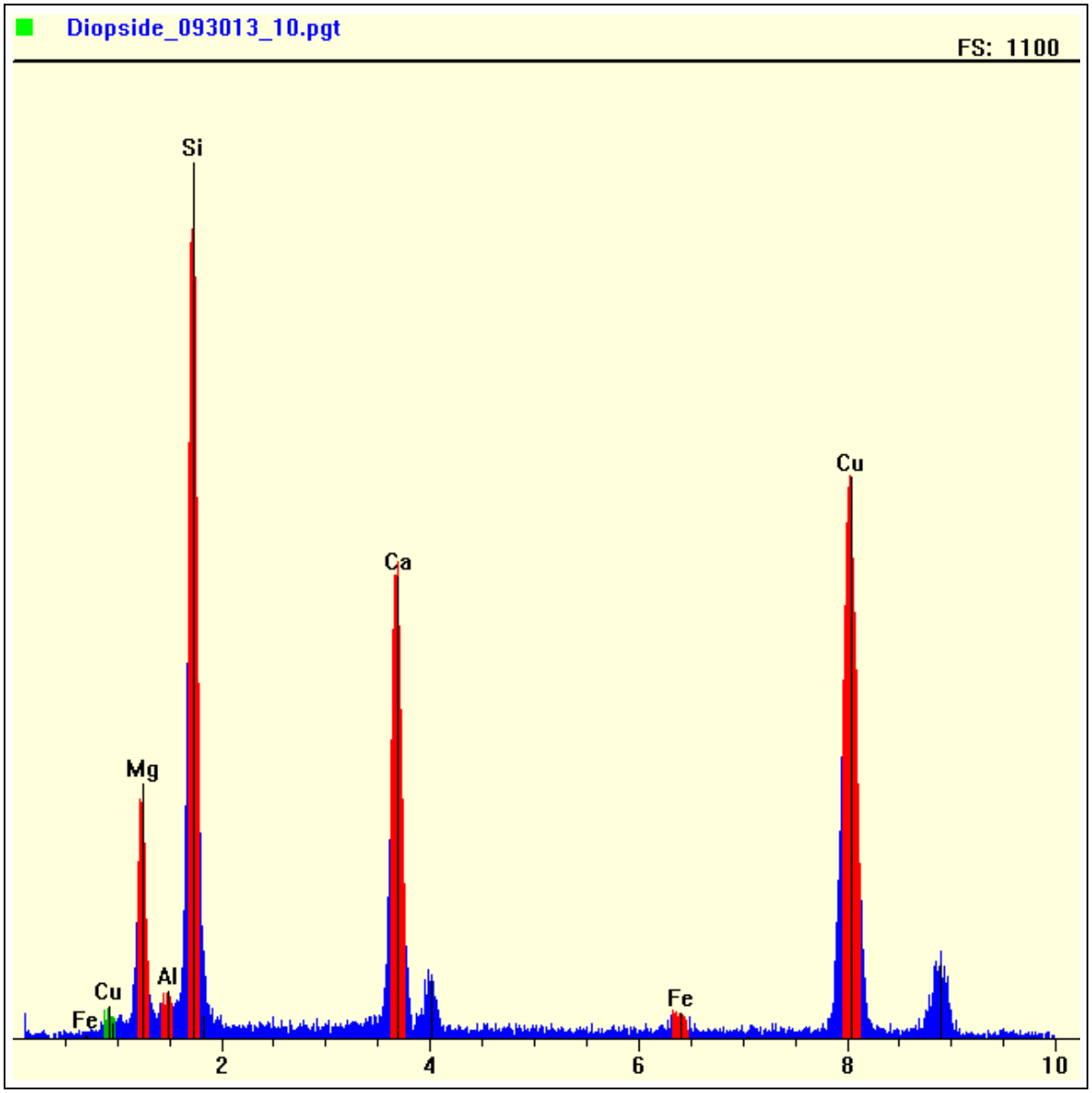
EDXA of Diopside Image 29041

Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...L27-2\EMSL27-2 2013\Diopside_01\Diopside_093013_10.pgt
Collected: September 30, 2013 10:16:44

Live Time:	150.73	Count Rate:	1174	Dead Time:	13.94 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



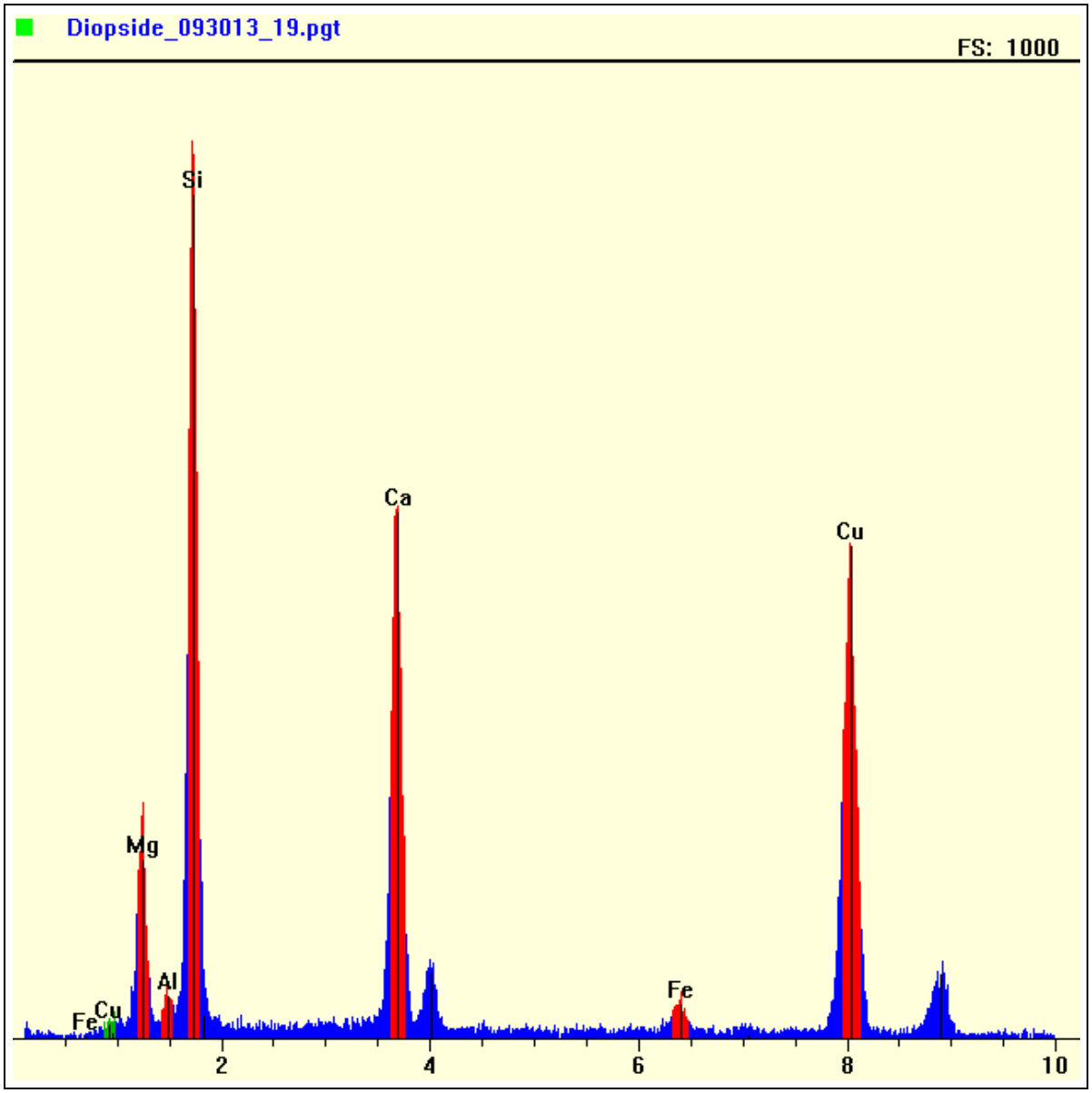
EDXA of Diopside Image 29047

Energy Dispersive X-Ray Analysis
Qualitative Spectrum

EMSL ANALYTICAL, INC.

File: F:\Documen...L27-2\EMSL27-2 2013\Diopside_01\Diopside_093013_19.pgt
Collected: September 30, 2013 10:16:44

Live Time:	104.09	Count Rate:	1515	Dead Time:	17.75 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	60.98



EDXA of Diopside Image 29057

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29019 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.5 mm
Mean Distance between spots on Center row (d2): 4.55 mm
Mean distance between spots on slant vector (d1): 4.79 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	**5.07**	5.300	**5.035**	**5.565**
d2 or hk0 (Camera K/zero row dist.)	**5.02**	5.099	**4.844**	**5.354**
d1 or hk1 (Camera K/slant vector dist.)	**4.76**	4.931	**4.684**	**5.178**
Ratio of hk0/hk1	**1.05**	1.03	**0.979**	**1.082**
Angle of Slant Vector (Measured)	68.0	68.0	**64.600**	**71.400**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (Reference JCPDS) By: EJWP

With a Zone Axis of: [3 1 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29031 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.25 mm
Mean Distance between spots on Center row (d2): 2.5 mm
Mean distance between spots on slant vector (d1): 5 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.37	5.300	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**9.13**	9.055	**8.602**	**9.508**
d1 or hk1 (Camera K/slant vector dist.)	**4.56**	4.482	**4.258**	**4.706**
Ratio of hk0/hk1	**2.00**	2.02	**1.919**	**2.121**
Angle of Slant Vector (Measured)	60.0	60.3	**57.314**	**63.347**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (Reference JCPDS) By: EJWP EJWP 10/21/2013
With a Zone Axis of: [1 0 0]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29035 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.37 mm
Mean Distance between spots on Center row (d2): 4.55 mm
Mean distance between spots on slant vector (d1): 8.92 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.22	5.300	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**5.02**	5.099	**4.844**	**5.354**
d1 or hk1 (Camera K/slant vector dist.)	**2.56**	2.560	**2.432**	**2.688**
Ratio of hk0/hk1	**1.96**	1.03	**0.979**	**1.082**
Angle of Slant Vector (Measured)	85.0	83.0	**78.850**	**87.150**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (Reference JCPDS) By: EJWP EJWP
With a Zone Axis of: [3 -1 -10]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29041 SCOPE # 27-2

Reference / Sample Number: Diopside

Preliminary ID: Diopside By: RSP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.4 mm
Mean Distance between spots on Center row (d2): 3.63 mm
Mean distance between spots on slant vector (d1): 4.57 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.19	5.250	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**6.29**	6.401	**6.081**	**6.721**
d1 or hk1 (Camera K/slant vector dist.)	**4.99**	5.042	**4.790**	**5.294**
Ratio of hk0/hk1	**1.26**	1.27	**1.207**	**1.334**
Angle of Slant Vector (Measured)	79.0	78.4	**74.480**	**82.320**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: EJWP 2SWP
With a Zone Axis of: [-1 -1 0]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29047 SCOPE # 27-2

Reference / Sample Number: DIOPSIDE

Preliminary ID: Diopside By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.33 mm
Mean Distance between spots on Center row (d2): 6.2 mm
Mean distance between spots on slant vector (d1): 9 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.27	5.250	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**3.68**	3.621	**3.440**	**3.802**
d1 or hk1 (Camera K/slant vector dist.)	**2.54**	2.552	**2.424**	**2.680**
Ratio of hk0/hk1	**1.45**	1.42	**1.349**	**1.491**
Angle of Slant Vector (Measured)	85.0	84.4	**80.180**	**88.620**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: EJWP zmp

With a Zone Axis of: [-4 2 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29057 SCOPE # 27-2

Reference / Sample Number: Diopside

Preliminary ID: Diopside By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.37 mm
Mean Distance between spots on Center row (d2): 3.64 mm
Mean distance between spots on slant vector (d1): 8.92 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.22	5.250	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**6.27**	6.401	**6.081**	**6.721**
d1 or hk1 (Camera K/slant vector dist.)	**2.56**	2.550	**2.423**	**2.678**
Ratio of hk0/hk1	**2.45**	2.51	**2.385**	**2.636**
Angle of Slant Vector (Measured)	80.0	79.9	**75.905**	**83.895**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: EJWP EJWP

With a Zone Axis of: [2 2 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 9/27/13

Indexing of negative number: 29019 SCOPE # 27-2

Reference / Sample Number: _____

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.4 mm
Mean Distance between spots on Center row (d2): 4.52 mm
Mean distance between spots on slant vector (d1): 4.75 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.2	5.3	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**5.05**	5.099	**4.844**	**5.354**
d1 or hk1 (Camera K/slant vector dist.)	**4.80**	4.931	**4.684**	**5.178**
Ratio of hk0/hk1	**1.05**	1.03	**0.982**	**1.086**
Angle of Slant Vector (Measured)	69.0	68.0	**64.591**	**71.390**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (JCPDS) By: KCollery
With a Zone Axis of: [3 1 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29031 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.29 mm
Mean Distance between spots on Center row (d2): 2.5 mm
Mean distance between spots on slant vector (d1): 4.99 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.32	5.300	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**9.13**	9.055	**8.602**	**9.508**
d1 or hk1 (Camera K/slant vector dist.)	**4.57**	4.482	**4.258**	**4.706**
Ratio of hk0/hk1	**2.00**	2.02	**1.919**	**2.121**
Angle of Slant Vector (Measured)	60.5	60.3	**57.314**	**63.347**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (JCPDS) By: KColberg
With a Zone Axis of: [1 0 0]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 9/27/13

Indexing of negative number: 29035 SCOPE # 27-2

Reference / Sample Number: _____

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.38 mm
Mean Distance between spots on Center row (d2): 4.54 mm
Mean distance between spots on slant vector (d1): 8.88 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.21	5.300	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**5.03**	5.099	**4.844**	**5.354**
d1 or hk1 (Camera K/slant vector dist.)	**2.57**	2.569	**2.441**	**2.697**
Ratio of hk0/hk1	**1.96**	1.99	**1.886**	**2.084**
Angle of Slant Vector (Measured)	83.0	83.0	**78.879**	**87.182**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (JCPDS) KC 10/22/13 By: KCollberg
With a Zone Axis of: [3 -1 -10]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 9/27/13

Indexing of negative number: 29041 SCOPE # 27-2

Reference / Sample Number: _____

Preliminary ID: Diopside By: RSP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.45 mm
Mean Distance between spots on Center row (d2): 3.59 mm
Mean distance between spots on slant vector (d1): 4.55 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.12	5.250	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**6.36**	6.401	**6.081**	**6.721**
d1 or hk1 (Camera K/slant vector dist.)	**5.02**	5.042	**4.790**	**5.294**
Ratio of hk0/hk1	**1.27**	1.27	**1.207**	**1.334**
Angle of Slant Vector (Measured)	79.0	78.4	**74.442**	**82.278**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: KColberg
With a Zone Axis of: [-1 -1 0]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29047 SCOPE # 27-2

Reference / Sample Number:

Preliminary ID: Diopside By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.4 mm
Mean Distance between spots on Center row (d2): 6.2 mm
Mean distance between spots on slant vector (d1): 8.9 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	**5.19**	5.250	**4.988**	**5.513**
d2 or hk0 (Camera K/zero row dist.)	**3.68**	3.621	**3.440**	**3.802**
d1 or hk1 (Camera K/slant vector dist.)	**2.56**	2.552	**2.424**	**2.680**
Ratio of hk0/hk1	**1.44**	1.42	**1.349**	**1.491**
Angle of Slant Vector (Measured)	84.5	84.4	**80.180**	**88.620**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: KColburg
With a Zone Axis of: [-4 2 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date:

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 9/27/13

Indexing of negative number: 29057 SCOPE # 27-2

Reference / Sample Number: _____

Preliminary ID: Diopside By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.38 mm
Mean Distance between spots on Center row (d2): 3.51 mm
Mean distance between spots on slant vector (d1): 8.93 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.21	5.250	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**6.50**	6.401	**6.081**	**6.721**
d1 or hk1 (Camera K/slant vector dist.)	**2.56**	2.526	**2.400**	**2.652**
Ratio of hk0/hk1	**2.54**	2.53	**2.407**	**2.661**
Angle of Slant Vector (Measured)	77.5	77.2	**73.378**	**81.102**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: KColberg
With a Zone Axis of: [2 -2 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29019 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.5 mm
Mean Distance between spots on Center row (d2): 4.45 mm
Mean distance between spots on slant vector (d1): 4.81 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.07	5.30	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**5.13**	5.099	**4.844**	**5.354**
d1 or hk1 (Camera K/slant vector dist.)	**4.74**	4.931	**4.684**	**5.178**
Ratio of hk0/hk1	**1.08**	1.03	**0.979**	**1.082**
Angle of Slant Vector (Measured)	68.0	68.0	**64.600**	**71.400**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite By: RSP

With a Zone Axis of: [3 1 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29031 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.75 mm
Mean Distance between spots on Center row (d2): 2.5 mm
Mean distance between spots on slant vector (d1): 5 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.37	5.30	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**9.13**	9.055	**8.602**	**9.508**
d1 or hk1 (Camera K/slant vector dist.)	**4.56**	4.482	**4.258**	**4.706**
Ratio of hk0/hk1	**2.00**	2.02	**1.919**	**2.121**
Angle of Slant Vector (Measured)	60.0	60.3	**57.314**	**63.347**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (JCPDS) By: RSP 10/24/13
With a Zone Axis of: [1 0 0]

Preliminary Identification was: [x] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Actinolite DATE: 09/27/13

Indexing of negative number: 29035 SCOPE # 27-2

Reference / Sample Number: Actinolite

Preliminary ID: Actinolite By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.5 mm
Mean Distance between spots on Center row (d2): 4.56 mm
Mean distance between spots on slant vector (d1): 8.88 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.07	5.30	5.035	5.565
d2 or hk0 (Camera K/zero row dist.)	**5.00**	5.099	**4.844**	**5.354**
d1 or hk1 (Camera K/slant vector dist.)	**2.57**	2.569	**2.441**	**2.697**
Ratio of hk0/hk1	**1.95**	1.99	**1.886**	**2.084**
Angle of Slant Vector (Measured)	85.0	83.0	**78.850**	**87.150**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite (JCPDS) By: RSP

With a Zone Axis of: [3 -1 -10]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29041 SCOPE # 27-2

Reference / Sample Number: Diopside

Preliminary ID: Diopside By: RSP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.5 mm
Mean Distance between spots on Center row (d2): 3.68 mm
Mean distance between spots on slant vector (d1): 4.63 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.07	5.25	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**6.20**	6.401	**6.081**	**6.721**
d1 or hk1 (Camera K/slant vector dist.)	**4.93**	5.042	**4.790**	**5.294**
Ratio of hk0/hk1	**1.26**	1.27	**1.207**	**1.334**
Angle of Slant Vector (Measured)	79.0	78.4	**74.480**	**82.320**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: RSP

With a Zone Axis of: [-1 -1 0]

Preliminary Identification was: [x] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29047 SCOPE # 27-2

Reference / Sample Number: Diopside

Preliminary ID: Diopside By: RSP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.5 mm
Mean Distance between spots on Center row (d2): 6.15 mm
Mean distance between spots on slant vector (d1): 8.87 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.07	5.25	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**3.71**	3.621	**3.440**	**3.802**
d1 or hk1 (Camera K/slant vector dist.)	**2.57**	2.552	**2.424**	**2.680**
Ratio of hk0/hk1	**1.44**	1.42	**1.349**	**1.491**
Angle of Slant Vector (Measured)	85.0	84.4	**80.180**	**88.620**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: RSP

With a Zone Axis of: [-4 2 2]

Preliminary Identification was: [X] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

AMPHIBOLE SAED INDEXING FORM

EMSL Order ID : Diopside DATE: 09/27/13

Indexing of negative number: 29057 SCOPE # 27-2

Reference / Sample Number: Diopside

Preliminary ID: Diopside By: EJWP

Using Camera Constant of: 22.82 mm Angstroms

Determined from negative number: 29010

Measured Inter-row spacing: 4.5 mm
Mean Distance between spots on Center row (d2): 3.54 mm
Mean distance between spots on slant vector (d1): 9 mm

	Calculated	Ref	- 5%	+ 5%
Inter-row spacing (Ångstroms)	5.07	5.25	4.988	5.513
d2 or hk0 (Camera K/zero row dist.)	**6.45**	6.401	**6.081**	**6.721**
d1 or hk1 (Camera K/slant vector dist.)	**2.54**	2.550	**2.423**	**2.678**
Ratio of hk0/hk1	**2.54**	2.51	**2.385**	**2.636**
Angle of Slant Vector (Measured)	80.0	79.9	**75.905**	**83.895**

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Diopside By: RSP

With a Zone Axis of: [2 2 2]

Preliminary Identification was: [x] CORRECT

[ ] INCORRECT

percent accuracy to date: _____

Non-conformance/Corrective Action Report

Section 1: Complete at time problem is identified		Lab:	EMSL27
Department:	Asbestos	**CAR#** (Assigned by Lab Mgr):	1310-01
Date Initiated:	10/10/13	**Person Initiating CAR:**	R. Pescador
Brief Problem Statement (30 Characters Max)	Documentation Issues		
Full Description of Non-conformance/ problem: (Note things like analyst names, order#, sample#, who reported, etc.)	Internal ILR 2713 271300800-0001. Grid opening and grid information was incorectly documented.		

Section 2: Complete when initial evaluation is performed			
Evaluation/ Investigation Details	From R. Denton: For Sample 271300800-0002 1 LA structure was listed on the benchsheet and Verified GO Map in GO C2: C8. The EDXA spectra you provided said that the structure was located in GO C1:G8. This structure was not located during the interlab verified analysis in either grid opening listed on the bench sheet/verified map or EDXA. During the reconciliation, the structure was located in GO C2:G8. This improper documentation lead to the false positive. Improper documentation. Labelling spectra based on the information collected from the benchsheet. The grid being analyzed (C2) was not recorded on the benchsheet at the time the spectrum as named and saved. I documented the grid on the spectrum to be C1 instead of C2 since C2 was not on the benchsheet at that time. GO C8 was recorded instead G8 du to the grid being oriented in a way that "G" looked like a "C".		
Evaluating Party & Date Completed:	R. Denton 10/10/13		
Remedial Actions Taken:	Have another personnel review paperwork before it is sent out or reported.		
Is Root Cause & Corrective Action Required (Yes/No)?	Yes	**If not, provide justification for this decision**	
Client notification required? *If yes, record contact details (who, when, how)?*	No		
Is Work Stop Necessary? *If yes, record details (who, when, until when)?*	**No**		
If Work Stop, record details of when it was lifted and who authorized:			

Section 3: Complete whenever a corrective action is required			
Root Cause:	Improper documentation was caused by not completing analytical worksheet correctly prior to moving to the next grid opening.		
Corrective Action:	When saving spectra and documenting GO's, switch to low mag and verify the correct opening is being documented. Analyst will ensure that directly upon moving to a new Grid, the grid ID will be documented before proceeding to a grid opening. Prior to recording the Grid opening the analyst will switch to low mag and ensure the GO ID. Once GO ID is confirmed the analyst will document it on the analytical worksheet.		
Corrective Action due date:	10/10/13	**Assigned to:**	R. Pescador
Evidence of commitment and compliance: *(e.g., revised documents, new documents, corrected records,etc. Docs can be inserted using Insert>Object)*	An extra level of QA will be performed at the lab level. There shall be 2 initials and date on the first page of the ICOC adjacent to the due date/time to show that at least 2 personnel have reviewed the paperwork.		
Manager Signoff:	R. Pescador	**Date:**	10/10/13

Section 4: Complete after implementation of corrective action					
Follow-Up Due Date:	10/10/13	**Follow-up Notes** (i.e., how was effectiveness determined, findings)**:**			
Follow-Up Completed By:	E.Wyatt-Pescador				
Date Completed:	10/10/13	**Outcome:**	Effective/ No Recurrences	**New CAR # (when necessary):**	

Matched Structures per GO

EMSL Order ID *271300573* **Sample ID:** *SM-10080* **Original Lab/QC Lab** *EMSL27/EMSL04* Printed: 10/29/2013

	Grid Opening ID	Re-preparation					Interlab					NISTIR 5351 QC CODE			Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	1st Read	2nd Read	RECONCILE	
1	E1 : B2		ND					ND							
2	E1 : B4		ND					ND							
3	E1 : B6		ND				0	F	2.6	0.5	LA	TN	TN		SAP references modification that coud not be determined or found on eRoom. Looking through other available documents, it was concluded that analysis was PCME >5.0um.
4	E1 : B8		ND					ND							
5	E1 : B10		ND					ND							
6	E2 : E1		ND					ND							
7	E2 : E3		ND					ND							
8	E2 : E5		ND					ND							
9	E2 : E7		ND					ND							
10	E2 : E9		ND					ND							
11	E3 : J1		ND					ND							
12	E3 : J3		ND					ND							
13	E3 : J5		ND					ND							
14	E3 : J7		ND					ND							
15	E3 : J9		ND					ND							

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
1	G1 : A1		ND					ND				Pass		
2	G1 : A2		ND					ND				Pass		
3	G1 : A3		ND					ND				Pass		
4	G1 : A4		ND					ND				Pass		
5	G1 : A5		ND					ND				Pass		
6	G1 : A6		ND					ND				Pass		
7	G1 : A7		ND					ND				Pass		
8	G1 : A8		ND					ND				Pass		
9	G1 : A9		ND					ND				Pass		
10	G1 : A10		ND					ND				Pass		
11	G1 : C1		ND					ND				Pass		
12	G1 : C2		ND					ND				Pass		
13	G1 : C3		ND					ND				Pass		
14	G1 : C4		ND					ND				Pass		

Comments:

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
15	G1 : C5		ND					ND				Pass		
16	G1 : C6		ND					ND				Pass		GRID TORN
17	G1 : C7		ND					ND				Pass		GRID TORN
18	G1 : C8		ND					ND				Pass		
19	G1 : C9		ND					ND				Pass		
20	G1 : C10		ND					ND				Pass		
21	G1 : E1		ND					ND				Pass		
22	G1 : E2		ND					ND				Pass		
23	G1 : E3		ND					ND				Pass		
24	G1 : E4		ND					ND				Pass		
25	G1 : E5		ND					ND				Pass		
26	G1 : E6		ND					ND				Pass		
27	G1 : E7		ND					ND				Pass		
28	G1 : E8		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
29	G1 : E9		ND					ND				Pass		
30	G1 : E10		ND					ND				Pass		
31	G1 : G1		ND					ND				Pass		
32	G1 : G2		ND					ND				Pass		
33	G1 : G3		ND					ND				Pass		
34	G1 : G4		ND					ND				Pass		
35	G1 : G5		ND					ND				Pass		
36	G1 : G6		ND					ND				Pass		
37	G1 : G7		ND					ND				Pass		
38	G1 : G8		ND					ND				Pass		
39	G1 : G9		ND					ND				Pass		
40	G1 : G10		ND					ND				Pass		
41	G1 : I1		ND					ND				Pass		
42	G1 : I2		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
43	G1 : I3		ND					ND				Pass		
44	G1 : I4		ND					ND				Pass		
45	G1 : I5		ND					ND				Pass		
46	G1 : I6		ND					ND				Pass		
47	G1 : I7		ND					ND				Pass		
48	G1 : I8		ND					ND				Pass		
49	G1 : I9		ND					ND				Pass		
50	G1 : I10		ND					ND				Pass		
51	G2 : B1		ND					ND				Pass		
52	G2 : B2		ND					ND				Pass		
53	G2 : B3		ND					ND				Pass		
54	G2 : B4		ND					ND				Pass		
55	G2 : B5		ND					ND				Pass		
56	G2 : B6		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
57	G2 : B7		ND					ND				Pass		
58	G2 : B8		ND					ND				Pass		
59	G2 : B9		ND					ND				Pass		
60	G2 : B10		ND					ND				Pass		
61	G2 : D1		ND					ND				Pass		
62	G2 : D2		ND					ND				Pass		
63	G2 : D3		ND					ND				Pass		
64	G2 : D4		ND					ND				Pass		
65	G2 : D5		ND					ND				Pass		
66	G2 : D6		ND					ND				Pass		
67	G2 : D7		ND					ND				Pass		
68	G2 : D8		ND					ND				Pass		
69	G2 : D9		ND					ND				Pass		
70	G2 : D10		ND					ND				Pass		

Matched Structures per GO for Reconciliation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
71	G2 : F1		ND					ND				Pass		
72	G2 : F2		ND					ND				Pass		
73	G2 : F3		ND					ND				Pass		
74	G2 : F4		ND					ND				Pass		
75	G2 : F5		ND					ND				Pass		
76	G2 : F6		ND					ND				Pass		
77	G2 : F7		ND					ND				Pass		
78	G2 : F8		ND					ND				Pass		
79	G2 : F9		ND					ND				Pass		
80	G2 : F10		ND					ND				Pass		
81	G2 : H1		ND					ND				Pass		
82	G2 : H2		ND					ND				Pass		
83	G2 : H3		ND					ND				Pass		
84	G2 : H4		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
85	G2 : H5		ND					ND				Pass		
86	G2 : H6		ND					ND				Pass		
87	G2 : H7		ND					ND				Pass		
88	G2 : H8		ND					ND				Pass		
89	G2 : H9		ND					ND				Pass		
90	G2 : H10		ND					ND				Pass		
91	G2 : J1		ND					ND				Pass		
92	G2 : J2		ND					ND				Pass		
93	G2 : J3		ND					ND				Pass		
94	G2 : J4		ND					ND				Pass		
95	G2 : J5		ND					ND				Pass		
96	G2 : J6		ND					ND				Pass		GRID TORN
97	G2 : J7		ND					ND				Pass		GRID TORN
98	G2 : J8		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
99	G2 : J9		ND					ND				Pass		
100	G2 : J10		ND					ND				Pass		
101	H1 : B1		ND					ND				Pass		
102	H1 : B2		ND					ND				Pass		
103	H1 : B3		ND					ND				Pass		
104	H1 : B4		ND					ND				Pass		
105	H1 : B5		ND					ND				Pass		
106	H1 : B6		ND					ND				Pass		
107	H1 : B7		ND					ND				Pass		
108	H1 : B8		ND					ND				Pass		
109	H1 : B9		ND					ND				Pass		
110	H1 : B10		ND					ND				Pass		
111	H1 : C1		ND					ND				Pass		
112	H1 : C2		ND					ND				Pass		

Matched Structures per GO for Reconciliation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
113	H1 : C3		ND					ND				Pass		
114	H1 : C4		ND					ND				Pass		
115	H1 : C5		ND					ND				Pass		
116	H1 : C6		ND					ND				Pass		
117	H1 : C7		ND					ND				Pass		
118	H1 : C8		ND					ND				Pass		
119	H1 : C9		ND					ND				Pass		
120	H1 : C10		ND					ND				Pass		
121	H1 : E1		ND					ND				Pass		
122	H1 : E2		ND					ND				Pass		
123	H1 : E3		ND					ND				Pass		
124	H1 : E4		ND					ND				Pass		
125	H1 : E5		ND					ND				Pass		
126	H1 : E6		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
127	H1 : E7		ND					ND				Pass		GRID TORN
128	H1 : E8		ND					ND				Pass		
129	H1 : E9		ND					ND				Pass		
130	H1 : E10		ND					ND				Pass		
131	H1 : F1		ND					ND				Pass		
132	H1 : F2		ND					ND				Pass		
133	H1 : F3		ND					ND				Pass		
134	H1 : F4		ND					ND				Pass		
135	H1 : F5		ND					ND				Pass		
136	H1 : F6		ND					ND				Pass		
137	H1 : F7		ND					ND				Pass		
138	H1 : F8		ND					ND				Pass		
139	H1 : F9		ND					ND				Pass		
140	H1 : F10		ND					ND				Pass		

Matched Structures per GO for Reconciliation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
141	H1 : G1		ND					ND				Pass		
142	H1 : G2		ND					ND				Pass		
143	H1 : G3		ND					ND				Pass		
144	H1 : G4		ND					ND				Pass		
145	H1 : G5		ND					ND				Pass		
146	H1 : G6		ND					ND				Pass		
147	H1 : G7		ND					ND				Pass		
148	H1 : G8	0	F	4.05	0.3	LA		ND				*Fail*	Length, Mineral	
149	H1 : G9		ND					ND				Pass		
150	H1 : G10		ND					ND				Pass		
151	H1 : H1		ND					ND				Pass		
152	H1 : H2		ND					ND				Pass		
153	H1 : H3		ND					ND				Pass		
154	H1 : H4		ND					ND				Pass		

Matched Structures per GO for Reconcilation Analysis

Printed: 10/29/2013

Reconciliation Analyst: _____

Date: _____

Scope: _____

EMSL Order ID *271300675* **Sample ID:** *P3-00774* **Original Lab/QC Lab** *EMSL27/EMSL04*

	Grid Opening ID	Re-preparation					Interlab					Results		Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	Conclusion	Failures due to	
155	H1 : H5		ND					ND				Pass		
156	H1 : H6		ND					ND				Pass		
157	H1 : H7		ND					ND				Pass		
158	H1 : H8		ND					ND				Pass		
159	H1 : H9		ND					ND				Pass		
160	H1 : H10		ND					ND				Pass		

Matched Structures per GO

EMSL Order ID *271300789* **Sample ID:** *4R-02146* **Original Lab/QC Lab** *EMSL27/EMSL04* Printed: 10/29/2013

	Grid Opening ID	Re-preparation					Interlab					NISTIR 5351 QC CODE			Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	1st Read	2nd Read	RECONCILE	
1	A1 : B5	0	F	4.15	0.2	NAM		ND				TN	TN		
2	A1 : B7		ND					ND							
3	A1 : B9		ND					ND							
4	A2 : E8		ND					ND							
5	A2 : E10		ND					ND							

Matched Structures per GO

EMSL Order ID *271300800-0002* **Sample ID:** *4R-02123* **Original Lab/QC Lab** *EMSL27/EMSL04* Printed: 10/29/2013

	Grid Opening ID	Re-preparation					Interlab					NISTIR 5351 QC CODE			Comments
	Grid:GO	Total Str #	Str Type	Length	Width	Mineral ID	Total Str #	Str Type	Length	Width	Mineral ID	1st Read	2nd Read	RECONCILE	
1	C1 : G6														
2	C1 : G8														
3	C1 : G10						0	F	3.9	0.76	NAM	TN	TN	TN	
4	C2 : C8	1	B	9.75	1.1	LA						FP	NL	NL	Reconcilation showed that fiber is go C2: G8
5	C2 : C10														